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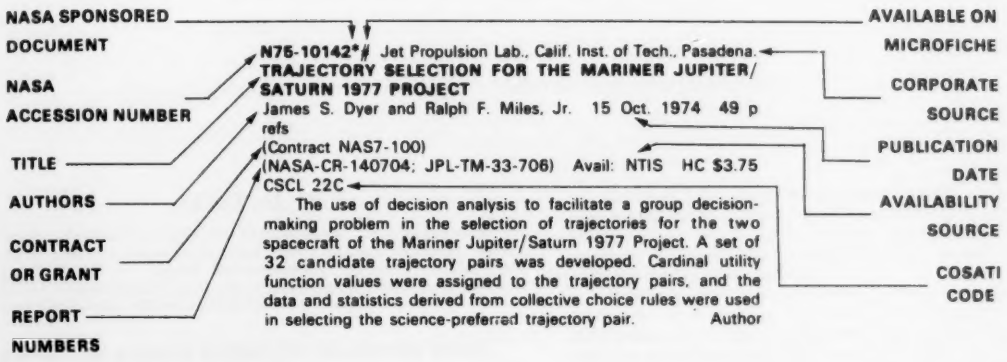
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COSATI CODE
N76-10142*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
TRAJECTORY SELECTION FOR THE MARINER JUPITER/ SATURN 1977 PROJECT
James S. Dyer and Ralph F. Miles, Jr. 15 Oct. 1974 49 p refs
(Contract NAS7-100)
(NASA-CR-140704; JPL-TM-33-706) Avail: NTIS HC $3.75
CSCL 22C
The use of decision analysis to facilitate a group decision-making problem in the selection of trajectories for the two spacecraft of the Mariner Jupiter/Saturn 1977 Project. A set of 32 candidate trajectory pairs was developed. Cardinal utility function values were assigned to the trajectory pairs, and the data and statistics derived from collective choice rules were used in selecting the science-preferred trajectory pair. Author

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power: Aircraft Stability and Control; and Research And Support Facilities (air). For Related Information See Also Astronautics.

1.0001, EXPANDED INTERCOM MULTIPLEX STUDY
J.W. CALVERT, Hughes Aircraft Company, *Los Angeles, California* (F33615-72-C-2185)

This effort relates to tempest problems which resulted in the issuance of USAF HQ ROC No 5-68 and USAFSS ROC No 19-68. The study seeks methods of expanding the conferencing capability of intercommunication systems for larger aircraft.

Experimental systems an/AIC-27(V)(XA-1) and an/AIC-27(V)(XA-2), produced on previous contracts will provide the basic concepts for expansion. The study will also produce a preliminary tradeoff evaluation of multiplexing versus hand-wired distribution methods. User requirements are to be included in the documentation.

Supporting agency address information: AF Avionics Laboratory AAI, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0002, THEORETICAL AND EXPERIMENTAL INVESTIGATIONS IN THE CONTROL OF AIRCRAFT
D.B. DEBRA, Stanford University, School of Engineering, *Palo Alto, California* 94305 (NSG 4002)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

1.0003, SMOOTHNESS REQUIREMENTS
W.J. HORN, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

Develop definitive requirements regarding both micro and macro surface smoothness for pavements. Determine the influence of variations in surface smoothness requirements on aircraft operations. Develop measuring methods for control purposes.

The study will be accomplished by conducting a thorough review of existing pavement performance, interviews with operating personnel and establishment of acceptable tolerances of pavement roughness as pertaining to operating conditions. Develop by means of computer simulation studies, etc. Methods to evaluate pavement surfaces. Obtain profiles of pavements and induce into the models to predict aircraft response due to changes in surface smoothness and indicate allowable limits that aircraft can sustain. Incorporate findings in a procedure manual.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg Mi. 39180.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0004, UPDATE PAVEMENT CONSTRUCTION METHODS
C.L. RONE, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

Conduct tests, develop advanced criteria, and investigate new construction methods and equipment to assure optimum utilization of most advanced and productive construction methods and equipment capabilities for design and construction of heavy-load airfield pavements.

Research new and innovative construction methods and equipment to determine compatibility between heavy-load airfield pavement design requirements and construction practices. Develop information through tests and analysis of technology advances in construction equipment and heavy construction practices, inspections of pavement construction projects, and thorough discussions with contractors and equipment manufacturers. Evaluate information to determine application to military construction to achieve design requirements or to tailor to be compatible with current construction practices and satisfy user requirements. Tests and evaluation will be conducted with new vibratory compactors on 6- to 8-in. Lifts of asphaltic concrete, full width spreading equipment, and slip-form concrete paving placement equipment. Data and information collected will be analyzed for engineering and economic (cost) impact on military airfield pavement design and construction. Criteria and methods developed will be used in formulating specifications and will be incorporated into guide specifications and manuals.

Supporting agency address information: OCE Waterways Experiment Station, Vicksburg Mi. 39180.

SUPPORTED BY U.S. Dept. of Defense - Army

1.0005, L-BAND RADIO ARCHITECTURE
R. ASHER, Internat. Telephone & Teleg., *Newark, New Jersey* 07110 (F33615-73-C-1294)

To develop the architecture and modular structure for a multifunction l-band radio system which can perform the communications and navigation functions now existing or in development in the band 960 to 1660 MHz. This includes the investigation of different partitionings of the system, such as common or shared RF, IF, and frequency buses and switching techniques for sharing, fault backup, etc. The goal is the reduction of total radio system costs when two or more systems in the frequency band of interest are implemented in an aircraft, these might include TACAN, beacon transponder, NAVSAT, Disicrete address beacon system, or other services between the A/C and the outside environment.

To generate and analyze different structures with respect to constraints and capabilities of existing technology and the costs of implementation and operation, select promising approach(es) to define interfaces and modules, and recommend a (brassboard) hardware validation if necessary.

Supporting agency address information: AF Avionics Laboratory AAA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0006, FIELD EVALUATION OF STROBE LIGHTS IN REDUCING BIRD STRIKES
J. DEBOER, U.S. Air Force, Weapons Laboratory, *Albuquerque, New Mexico* 87117

The purposes of this study are to investigate the protective value of stroboscopic light in avoiding bird strikes and to determine the advisability of stroke light installation on all USAF aircraft.

Stroke lights will be installed on USAF aircraft under experimental conditions to test the effectiveness of stroke lights in reducing the number of bird strikes. AFWL will design the experiments, develop data forms, analyze the data and submit the final reports. AFFDL will handle the aircraft modification and the test wing will record the data.

Supporting agency address information: AF Weapons Laboratory Dee, Kirtland AFB, N. Mex. 87117

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0007, VIBRATION TESTING OF ASSEMBLED EXTERNALLY CARRIED AIRCRAFT STORES FOR THEIR CAPTIVE FLIGHT ENVIRONMENT

A.H. BURKHARD, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Rigorous vibration test criteria for assembled aircraft stores (such as bombs, missiles, drones, and ECM pods) do not exist at present. The object of this effort is to establish laboratory vibration qualification test criteria which will integrate with an already developed vibracoustic criteria so that the complete vibration environment of aircraft stores will be tested. This will result in increased reliability and lower maintenance cost for aircraft stores.

Laboratory experiments will be conducted on assembled stores to develop a test criteria which will more accurately represent low frequency (less than 200 Hertz) inputs from such effects as aircraft motion, gusting, landing, etc. A general qualification test criteria will be formulated based on these laboratory results.

Supporting agency address information: AF Flight Dynamics Laboratory FEE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0008, X-24B FLIGHT TEST DATA ANALYSIS

V. DAHLEM, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Wind tunnel data are not adequate for complete determination of the aerodynamic performance characteristics of advanced high speed USAF military aircraft concepts. Flight data from experimental aircraft must be obtained and analyzed to provide complete design information. Therefore the objective of this effort is to analyze the aerodynamic data from the X-24B flights. Technology information will be extracted from the flight data and new correlations and analysis methods will be developed.

Develop comparisons between X-24B flight test data and wind tunnel data. Identify aerodynamic phenomena which indicate deficiencies in wind tunnel technique or which illustrate unique aerodynamic and performance characteristics.

Supporting agency address information: AF Flight Dynamics Laboratory FXG, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0009, TEST AND EVALUATION OF ADVANCED MECHANICAL SUBSYSTEMS

P.F. DEXTER, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

High operational costs are incurred with landing gear systems due to structural failures that are caused by fatigue and corrosion. In addition, landing gear and other related subsystem components add high parasitic weight to aircraft systems and thus reduce the aircraft payload and performance. Composite material landing gear and subsystem hardware has the potential to eliminate many of these problems. It is the objective of this program to test and evaluate full size composite material landing gear and subsystem hardware in order to fully establish the feasibility of these components.

The effort involves static, fatigue and flight testing of full size composite material landing gear hardware. Computer analyses of test results will be conducted in-house. This testing will closely simulate the operational conditions of aircraft landing gear. Comparison between the composite material hardware and conventional metallic hardware will be established and the feasibility of this hardware established.

Supporting agency address information: AF Flight Dynamics Laboratory FEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0010, PROPULSION SIMULATION RESEARCH

R.G. DUNN, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - electromagnetic weaponry and advanced aerospace propulsion. Deficiency - lack of fundamental data on fluid dynamic, chemical and thermodynamic processes occurring in high energy gas laser and supersonic burning ramjet flows. Research - fundamental studies of fluid dynamic, chemical kinetic, and nonequilibrium phenomena occurring in high-speed heterogeneous gas flows. How research contributes - provides improved understanding of turbulent mixing and reaction phenomena for high-speed heterogeneous gas streams in confined ducts. Research results are applicable tc specific fluid dynamic problem areas in high-energy chemical and gasdynamic lasers, also to airbreathing hypersonic propulsion concepts.

Studies involving two-dimensional nozzle injection and turbulent mixing of heterogeneous gases will be made to investigate the effects of nozzle geometry, injection pressures, and flow mach numbers on simulated chemical laser flowfields. Research investigations on two gasdynamic laser concepts - the ram air-breathing laser and the mixing GDL - are also being undertaken. Experimental and numerical studies of turbulent mixing and supersonic combustion in confined hydrogen-air streams will be performed at low static pressures over wide ranges of temperature and flow velocity. Flow diagnostic measurements, appropriate to all of the above areas, include static and impact pressure, total temperature, gas sampling, and absorption spectroscopy.

Supporting agency address information: Aerospace Research Laboratory LF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0011, DEVELOPMENT OF SUPPLEMENTAL COMPUTER CODES FOR THE ANALYTICAL PREDICTION OF STORE SEPARATION

C.L. DYER, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The objective is to develop a predictive technique to solve the problem of the separation of stores from current and future aircraft having multiple fixed pylons configurations such as the A-7D or A-10A. more comprehensive flow field model will be developed for use in prediction of store separation from any fighter-bomber aircraft. The aircraft configuration flow-field modeling will include multiple pylons modeled by vortex lattice and thickness panel techniques.

The computer code generated by Nielsen Engineering under work unit 82190103 will be modified using the theory in AFFDL-TR-72-83, 'Prediction Of Six Degree Of Freedom Store Separation Trajectories At Speeds Up To The Critical Speed,' Mar 72. When the extended computer code is completed, it will be used to generate store separation trajectories contained in AFATL-TR-72-120, 'Separation Characteristics Of Several External Stores From The A-7D Aircraft At mach Numbers From 0.235 To 0.95,' Jul 72, to evaluate the change in prediction accuracy that the more complex flow field model produces.

Supporting agency address information: AF Flight Dynamics Laboratory FGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0012, MATHEMATICAL PROBLEMS IN FLUID DYNAMICS

K.G. GUDERLEY, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - advanced aircraft design. Deficiency - present design methods have great difficulties to predict the behavior of airfoils in the transonic region. Research - work investigates theoretically problems of transonic aerodynamics. Sometimes special features, as the junction of sonic line and shock, are studied but most of the work is done with a view towards improving the methods for computing the whole flow pattern. The work includes the development of background knowledge, in particular partial differential equations. How research contributes - the investigations are directed towards improving the numerical

techniques, as well as the physical understanding of the phenomena in transonic and, to a limited extent, also in other flow fields. The greater part of this work constitutes ARL's response to RN-AFFDL-07-72- 12.

The problem is treated under two different points of view - namely the study of properties of the partial differential equation and of its solutions which may be the cause of computational difficulties, and the direct study of numerical approaches. In the first part the nature of the solutions of typical boundary value problems will be investigated, in the second part a specific numerical technique will be examined with a view towards determining how well it or certain variants are suited to overcome the typical obstacles encountered in transonic flows.

Supporting agency address information: Aerospace Research Laboratory LB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0013, CREW ESCAPE UNDER HIGH G IN AN EJECTION SEAT

A.M. HIGGINS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The successful ejection and safe clearance of an aircrewman from an aircraft while under high g maneuvering loads is questionable. It is the objective of this effort to determine the theoretical feasibility of designing an ejection seat escape system for successful crew escape from a single place aircraft while under high g and ensuing environments. If escape is feasible a preliminary design of an ejection seat escape system will be completed. The high g considered will be in the Sagittal plane of the aircrewman since the prime component of acceleration on the aircrewman is along the axis perpendicular to the longitudinal and lateral axis of the aircraft.

Performance analyses of several candidate design approaches will be conducted to arrive at the most promising. Considerations for functions within the cockpit during emergence and as a body in free flight will be pursued. Special considerations for canopy design and jettison will also be included. Simplified mock-up techniques will be used as a design tool throughout the program.

Supporting agency address information: AF Flight Dynamics Laboratory FER, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0014, STABILITY AND CONTROL PREDICTION METHODS

D.E. HOAK, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The problem involved in accurately defining aerodynamic stability and control characteristics is critical to the successful accomplishment of both strategic and tactical combat missions. This objective is to continually examine new data and theoretical knowledge concerning the understanding and prediction of aerodynamic phenomena, with particular attention given to those aspect pertinent to stability and control. Also, an awareness of existing and potential problems in this area must be fostered to insure appropriate application of existing knowledge and to form a basis for the formulation of programs to overcome critical difficiencies.

Studies of existing and new aerodynamic theory and experimental data compilations will be implemented to establish a comprehensive technology base. Attention will be focused on vital areas in which problems exist or are forseen and in which technology is dificient. Programs will be planned, and analytical, empirical and graphical relations will be developed to improve the prediction of aerodynamic stability and control characteristics for all classes of flight vehicles.

Supporting agency address information: AF Flight Dynamics Laboratory FGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0015, INVESTIGATION OF SUPERSONIC WING-TAIL FLUTTER

L.J. HUTTSELL, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

An important design problem for supersonic fighter aircraft with variable sweep wings is a flutter instability of the wing-fuselage-tail combination when the wing is close to the horizontal tail where aerodynamic interference is significant. Analytical methods are needed in the design stage to prevent flutter restrictions that degrade the operational effectiveness and affect flight safety. The objective of this effort is to provide experimental flutter data needed to validate new and improved analytical methods required to predict and prevent flutter instabilities. This effort will establish the reliability of the analytical methods used to reduce the costly wind tunnel and flight flutter tests that are required to assure flight safety of all military aircraft.

A wing-fuselage-tail flutter model representative of a typical fighter aircraft will be tested by the AFFDL/FYS in the AEDC 4T wind tunnel to obtain flutter data in the low supersonic speed regime (m equals 1.3). An in-house effort will be conducted to correlate the test results with analytical results obtained using the recently developed Mach Box Program (AFFDL-TR-71-108).

Supporting agency address information: AF Flight Dynamics Laboratory FYS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0016, COMPOSITE MANEUVER AUGMENTATION (COMMA) FLIGHT TEST

T.L. LARSEN, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Advancements in maneuvering technologies are needed to satisfy transonic maneuvering requirements of future fighter aircraft. Advanced concepts in maneuver augmentation are currently being studied by industry and government. The evaluation of these concepts, integrated into the working environment, is a vital step in the evolution of advanced technologies. There has been a large amount of exploratory development in advanced composites and internally blown jet flaps. The objective of this effort is the design, fabrication, and free flight evaluation of a remotely piloted test bed incorporating these promising technologies.

A composite, jet flap wing will be built and flight tested on a modified BQM-34F Supersonic Firebee Drone. The preliminary design, performance analysis, and the stability and control analysis of the vehicle will be performed by AFFDL personnel with contractor support where required. Modification of the vehicle and fabrication of the new wing will be managed under instrument-1207-01-13. Planning and provisions for flight testing, as well as the complete flight test program will be managed under this instrument-1989-01-02.

Supporting agency address information: AF Flight Dynamics Laboratory PTR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0017, JOINT NAVY/AF/MOD VAK-191B FLIGHT TEST PROGRAM

R.B. LOWRY, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The availability of data (design, performance, and operational) on lift plus lift cruise v/stol aircraft is non-existent in the United States. The German Government has designed and fabricated the vak-191b aircraft, which is the only lift plus lift cruise aircraft in the Free World. To evaluate the potential of this configuration and define its characteristics, a joint Navy, FRG, USAF Flight Test Program has been proposed. The objective of this effort is to evaluate the VAK-191B aircraft as a representative lift plus lift cruise v/stol vehicle in such areas as handling qualities, pilot workload, ground effects, footprints, recirculation, systems reliability, performance and operational procedures. The VAK-191B vehicle incorporates several advanced systems, such as fly-by-wire control, 4,000 psi hydraulic system and a lightweight auxiliary power unit. Operational data on these systems can significantly add to the reliability/maintainability data base.

A joint FRG/Navy/Air Force/Fokker-VFW Flight Test Program will be conducted at Manching, Germany, using two of the VAK-191B vehicles and the German Flight Test Center facilities. Funding for this program will be provided by the Navy and the FRG. The Air Force (AFFDL) will participate in the flight test planning and data analysis portions of this program.

Supporting agency address information: AF Flight Dynamics Laboratory PTC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0018, NON-NUCLEAR VULNERABILITY OF LIQUID HYDROGEN FUEL TANKAGE SYSTEMS

V.L. MANGOLD, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The non-nuclear vulnerability of liquid hydrogen (lH2) must be assessed before it can be considered as an alternate fuel for military aircraft applications. The objective of this program is to establish technology for evaluating the survivability and vulnerability (s/v) of lH2 fuel systems to non-nuclear hostile threats. Technology obtained from this program will have applications to the safe use of lH2 fuel in commercial aircraft.

This effort will establish facilities and a safe location for conducting experimental programs with lH2. These facilities will be used to provide a data base for development of criteria and technology for evaluating the s/v of the lH2 fuel systems to non-nuclear hostile threats.

Supporting agency address information: AF Flight Dynamics Laboratory PTS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0019, FLIGHT MEASUREMENT OF WING WAKE VORTICITY

F.L. PAILLET, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Three million dollars are lost each year during USAF operations because of the wake turbulence hazard. The objective of this program is to investigate the wake turbulence field behind a full scale aircraft so as to develop tractable models of this vortical wake flow. The analysis developed will then be used to form advisories for purposes of reducing wake turbulence type accidents within USAF.

To conduct an analytical examination of the near field behind a full scale l-19 to determine the vortical properties of the flow associated with the rollup and formation of the tip trailed vortices. Results will be compared to test data from a 6-element, hot-film, constant temperature anemometer used to make the velocity measurements, the anemometer is mounted to the aircraft of the vorticity sheet behind the actual l-19 aircraft. The analysis will be used to develop tractable models of vortical flow fields.

Supporting agency address information: AF Flight Dynamics Laboratory FGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0020, MULTI-AXIS STOCKASTIC OPTIMAL PILOT MODEL

J.J. POLLARD, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The prediction of aircraft handling qualities by use of analog and/or digital computation methods prior to actual aircraft flight test and as a tool for design work requires continued theoretical control study. The design of military aircraft becomes more expensive by the year and the type of simulation efforts anticipated by the project could eliminate expensive hardware manufacture and modifications. This project will attempt to design a thinking pilot capable of making decisions, controlling the vehicle, and relating its performance to other aircraft in similar flight conditions. This stochastic optimal pilot model of a six degree of freedom linearlized aircraft in turbulence will be developed using the CDC 6600 digital compution system. The end result of this project is expected to be a Fortran IV Computer Program available for use in control design and handling qualities prediction.

The problem will be attacked in stages of increasing complexity. First the aircraft model will be studied for sensivity to gust. Then a simple pilot consisting of a sequentially sampling Kalman Filter and suboptimal controller will be added. Next a decision criteria measurement filter will be designed for use with non sequential data. Time delays, prediction, and parameter identification will also be added. Work will be carried out using the CDC 6600 compution system.

Supporting agency address information: AF Flight Dynamics Laboratory FGD, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0021, GROUND IMPACT ACCELERATION ASSESSMENT CAPABILITY

E.O. ROBERTS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Aircarft emergency crew escape modules, drones, and other aerospace vehicles recoverable by parachutes are subjected to a ground landing impact environment during the terminal phase of recovery. Various methods and techniques have been used to attenuate the accelerations resulting from landing impact, however, the effective design of landing shock attenuation systems has been impaired by the lack of techniques to accurately predict the expected acceleration environment and acceleration inputs to the vehicle. As a result, lengthy and costly development tests have to be performed to determine the effectiveness of the attenuation system and the magnitude of the accelerations at vehicle locations. The objective of this program is the development of an acceleration environment assessment capability to be used as an engineering tool for the prediction of landing impact acceleration functions at the crew stations and/or equipment locations of manned and unmanned aerospace vehicles.

A literature search and survey of related work in the areas of ground impact and transmission of acceleration functions through structural components will be performed. Computerized, analytical acceleration environment assessment techniques will be generated and the results compared with available experimental test data. Engineering tools for the prediction of the magnitude and duration of the acceleration spikes at various vehicle locations will be developed.

Supporting agency address information: AF Flight Dynamics Laboratory FER, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0022, AIRCRAFT GROUND TESTING OF A37B GRAPHITE EPOXY LANDING GEAR HARDWARE

G.C. SHUMAKER, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Stress corrosion and fatigue induced failures on present landing gear systems are high maintenance and operational cost items. In addition, landing gear systems account for up to 10 percent of the aircrafts weight and this burdensome weight serves no useful purpose in flight. The objective of this work unit is to test a complete landing gear outer cylinder and side brace assembly made from graphite epoxy composite material. Ground tests will also be conducted on an A37B aircraft. The fabrication of landing gear hardware from composite materials will result in reductions in corrosion fatigue problems and a 30 to 40 percent weight reduction. Thus a significant reduction of life cycle costs will be made possible.

In-house testing of A37B graphite epoxy landing gear outer cylinder and side brace hardware will be conducted to verify the flightworthiness of these components. The test results will be documented.

Supporting agency address information: AF Flight Dynamics Laboratory FEM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0023, ANALYSIS OF FLIGHT CONTROL SYSTEMS

D.J. SOUTH, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The effectiveness of a military flight vehicle is dependent upon the limitations of the vehicle's flight control system. Proper control analysis techniques must be available if flight control systems are to be designed which allow full utilization of a vehicle's structural and propulsive capabilities, while being of minimum complexity to reduce system costs and increase system reliability. The objective of this effort is to insure that adequate techniques are available for the analysis of flight control systems for military flight vehicles.

An awareness of the state-of-the-art of control analysis techniques will be maintained by reviewing new technical reports and papers and through personal communication with workers in the field. Control analysis needs will be identified. New analysis techniques satisfying those needs will be developed through in-house work and by formulating plans for contracted work. The usefulness of new analysis techniques will be demonstrated by applying them during the analysis of selected flight control systems.

Supporting agency address information: AF Flight Dynamics Laboratory FGC, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0024, EXTERNAL STORE EFFECTS ON TRANSONIC WING AERODYNAMICS

V.E. STUDWELL, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The carriage of external stores on high performance aircraft can cause severe degradation of aircraft performance and handling qualities. The effects of external stores on wings employing advanced airfoil sections are largely unknown. The objective of this effort is to isolate the interference effect of external stores on an aircraft wing in transonic flow. Accomplishment of this effort will enhance operational effectiveness, improve reliability and reduce costs.

The investigation will be conducted experimentally to determine the effect of various external store configurations on the aerodynamics of conventional and advanced airfoils beginning with quasi-two dimensional sections and extending to half span models with and without leading edge sweep. The test regime will be initially limited to the mach range of 0.7 to 1.4. Data will consist of airfoil chordwise pressure distribution and flow visualization for defining areas of flow separation on the airfoil surface. As needed, fundamental investigations will be initiated into the fluid mechanics of transonic flow to enhance the understanding of observed phenomena.

Supporting agency address information: AF Flight Dynamics Laboratory FXM, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0025, SURVEY OF CREW ESCAPE TECHNOLOGY

R.H. WALKER, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

For the past few years the survival rate of USAF crewmembers ejecting from military aircraft has been lower than previously experienced. This effort will be directed at determining why the ejection survival rate is declining and what can be done in the crew escape area to reverse the current trend by analyzing ejection statistics and current system capabilities with regard to present and future aircraft performance projections.

An investigation of emergency crew escape statistics will be performed to determine the conditions at ejection for possibly indicating a pattern to the resulting injuries, fatalities or successes. An analysis of current emergency crew escape systems to include the effects of individual components on total system performance will be conducted. Correlation of the statistical analysis with the system analysis will be accomplished to define current system limitations and problems. A projection of required crew escape capabilities based on aircraft systems of the future will be accomplished.

Supporting agency address information: AF Flight Dynamics Laboratory FER, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0026, WIND TUNNEL WALL INTERFERENCE UNDER HIGH LIFT CONDITIONS APPROPRIATE TO TRANSONIC MANEUVERING OF AIR SUPERIORITY AIRCRAFT

T.M. WEEKS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Reliable ground simulation of forces and moments significantly reduces acquisition costs of high performance fighter aircraft. serious technological deficiency is the inability of present day wind tunnels to deliver results fully free of wall influence in the transonic regime. This is especially true under high lift maneuvering conditions. The current effort will provide here-to-fore unobtainable definition of crossflow properties of conventional slotted as well as revolutionary minimum interference wall concepts. This will lead to far more accurate wall effect corrections and will expand the boundaries of interference free simulation resulting in reduced time and cost to acquisition.

A systematic set of flow property measurements will be made on the conventional slotted wall of the AFFDL trisonic facility. The key piece of instrumentation will be an in-house designed and developed flow sensor yielding highly accurate flow angle and mass flux measurements. Measurements will be repeated on a revolutionary contoured slotted wall using a set of two-dimensional models to evaluate the degree of wall interference reduction. The experimental effort will be combined with the development of a numerical code to incorporate the new wall crossflow properties under high lift conditions.

Supporting agency address information: AF Flight Dynamics Laboratory FX, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0027, ADVANCED CONCEPTS OF TURBO MACHINERY

A.J. WENNERSTROM, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - aerospace propulsion, powered ground support equipment, aerodynamic ground test facilities. Deficiency - axial compressors require improvements in efficiency, flow swallowing capability, and stage pressure ratio in order to reduce size, weight, complexity, and cost of turbine engines. Research - analytical and experimental evaluation of high-speed compressor design concepts and innovations. How research contributes - provides new capabilities for increasing the performance of axial type compressors and leads to reductions in size, weight, and number of parts required for turbine engines.

This effort includes creation of aerodynamic design methods and configuration innovations, design of research compressor stages, and experimental test and evaluation of these stages. Effort also includes work on new concepts or techniques of instrumentation for compressor research. Two specific problem areas now under study, first, is fully supersonic stages of extremely high pressure ratio, e.g. 3 to 1 per stage. Required efficiency about 82 percent state-of-the-art is about 76 percent. Second area is transonic stages of extremely high flow rate and relatively high pressure ratio, e.g. 40 lbs/sec per square ft frontal area at 2 to 1 pressure ratio. State-of-the-art about 37 lb/sec per square ft at about 1.8 to 1. The use of boundary-layer control devices within a compressor is being investigated.

Supporting agency address information: Aerospace Research Laboratory LF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0028, ANALYSIS OF NONLINEAR EFFECTS IN AIRCRAFT STRUCTURES

G.F. ZIELSDORFF, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The design of modern aircraft requires that the designer be able to analyze a structure under extreme load conditions which will produce nonlinear material and geometric behavior. This work will provide basic analytical tools necessary to perform efficient and reliable nonlinear structural analyses.

The finite element method of structural analysis will be used as the basis of this study. Results of research efforts already completed in this area by AFFDL and other government organizations will be used and made compatible with present and future AF requirements for performing nonlinear structural analysis. Present systems related problems not solvable by available techniques will be used as 'benchmark' studies throughout this investigation.

Supporting agency address information: AF Flight Dynamics Laboratory FBR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

1.0029, X-24B GROWTH VERSION
W.P. ZIMA, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The lack of sufficient flight research at high speeds approaching mach numbers 4 to 6, creates a technological deficiency which threatens the development of an adequate force structure in the next two decades. Definition of strategic and air superiority vehicles of the future will necessitate the availability of basic aerodynamic/aerothermodynamic criteria on which to predicate the high performance configurations. The growth version of the X-24B research vehicle will provide a low- cost/low-risk method of obtaining basic data directly applicable to these configurations. The specific objective of this effort is to explore the technical feasibility of modifying the X-24B research vehicle to produce a viable low-cost test bed to explore the aerodynamic/aerothermodynamic phenomenon inherent in high speed flight.

The operational, stability and control and thermal constraints inherent with the modified X-24B research vehicle shall be analyzed. Additionally, subsystem, structural and thermal protection requirements will be assessed. Analytical studies, empirical prediction techniques and computer synthesis programs will be utilized to formulate the initial aerodynamic configurations and define the aerodynamic, performance and thermal characteristics. Utilization of joint Air Force/NASA in-house capabilities to accomplish the above analysis shall provide a low-cost, cooperative approach to completing the feasibility study phase of the system acquisition cycle. Wind tunnel test at speeds ranging to 6.0 mach number will be conducted on selected vehicle configurations to establish the credibility of the design of the X-24B growth vehicle. The practicability of flying various experiments on this vehicle will be determined.

Supporting agency address information: AF Flight Dynamics Laboratory FXS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, S/M FOR OPERATION OF WALLOPS FLIGHT CENTERS TECHNICAL LIBRARY
J.C. SMITH, Univ. of Maryland, Graduate School, *College Park, Maryland* 20740 (NAS 6-2595)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

2.0002, A DUAL-MODE GENERALIZED RATIO APPROACH TO SELF-REORGANIZING DIGITAL FLIGHT CONTROL SYSTEM DESIGN
A.S. WILLSKY, Mass. Inst. of Technology, Graduate School, *Cambridge, Massachusetts* 02139 (NSG 1112)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

2.0003, METHODS OF ANALYSIS OF DIFFERENTIAL EQUATIONS AND THEIR APPLICATIONS TO GYROSCOPIC SYSTEMS
P.R. SETHNA, Univ. of Minnesota, School of Mechanical Engin., *Minneapolis, Minnesota* 55455 (AF-AFOSR-2284-72)

It is important to develop improved attitude control and stabilization techniques for manned and unmanned aerospace vehicles. Current models are often inadequate, and the analytical methods necessary for their utilization are intractable. In many aerospace systems, the gyroscope plays the role of a sensing element in a closed loop system, e.g., in stable platforms, gyro-verticals and artificial horizons, the response of a gyroscope to a disturbance is used through a feedback loop to cause the main system to maintain a desired orientation. There are also many gyroscopic instruments in which appropriately designed feedback loops are needed, e.g., in integrating gyro-acceleromaters and angular accelerometers. This research program addresses a central problem in this area, the analysis of high spin gyroscopic systems, and the synthesis of optimal controls for such systems, by the methods of singular perturbation theory. One specific objective is the solution of the related systems of differential equations, utilizing solutions of systems one-half the order of the original systems. Practical high spin gyroscopic systems are often control systems, and the above investigations are equally useful in this context. Related problems concerning asymptotic results for ordinary differential equations containing a parameter are also being investigated.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

2.0004, STUDY FOR VALIDATION & SPECIFICATIONS FOR A SPACE SHUTTLE RFI EXPERIMENT
R.M. SHOWERS, Univ. of Pennsylvania, School of Engineering, *Philadelphia, Pennsylvania* 19104 (NAS 5-20707)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

2.0005, STABILITY AND CONTROL OF FLEXIBLE SPACECRAFT
L. MEIROVITCH, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (NSG 1109)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, ENVIRONMENTAL EFFECTS ON COMPOSITE MOTOR COMPONENTS
W.S. CROWNOVER, U.S. Army, Propulsion Directorate, *Huntsville, Alabama* 35809

The objective of this task is to develop new engineering information for composite materials applicable to solid rocket motor components. Currently fiberglass, PRD-49, type III and graphite reinforced composites are being considered for advanced rocket motor case applications because of their unique properties such as strength to weight and stiffness to weight. These components must operate in a field environment with no loss in rocket motor performance. This task will evaluate these materials in typical Army environments.

Three inch diameter rocket motor cases utilizing fiberglass, PRD- 49, type III and graphite reinforced composites will be subjected to typical field temperature and humidity extremes and performance measured. Necessary protective measures for the composites will be probed.

Supporting agency address information: Micom Propulsion Directorate, Redstone Arsenal, Al. 35809

SUPPORTED BY U.S. Dept. of Defense - Army

3.0002, COMPATIBILITY OF REINFORCED STRUCTURES
J.L. PARHAM, U.S. Army, Gnd. Equipment & Materials Dir, *Huntsville, Alabama* 35809

To achieve optimum strength and compatibility of glass and other filament or fiber-reinforced structural materials and generate the design data necessary to insure maximum applicability to missile structural design.

A designed experimental approach to the effects of processing parameters for reinforced composite structural materials on the strength, modulus, and environmental resistance is planned. An initial task that would classically require 4500 tests has been reduced to 900 tests through a designed statistical matrix.

Supporting agency address information: Micom Ground Equipment and Materials Directorate, Redstone Ar, Al. 35809

SUPPORTED BY U.S. Dept. of Defense - Army

3.0003, SYNTHESIS OF NEW SUPERHARD MATERIALS AND THEIR APPLICATION TO CUTTING TOOLS
R.F. BUNSHAH, Univ. of California, School of Engineering, *Los Angeles, California* 90024 (F44620-74-C-0044)

Air force flight vehicles will require improved tough, heat resistant materials in order to meet future mission profiles. Both reentry vehicles and turbine blades are examples of where significant advancements in materials technology will yield high payoffs to AF flight systems. This program has two objectives; first, to investigate the synthesis of new superhard materials, and second, to examine and evaluate the utilization of these superhard materials as coatings on the high speed steel cutting tools. The synthesis of materials will be accomplished using activated reactive evaporation (ARE). Synthesis of carbides, nitrides, oxides and two-phase alloys will be explored under this contract.

Supporting agency address information: AF Office Of Scientific Research NA, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0004, PHYSICAL METALLURGY OF BETA TITANIUM ALLOYS
S.M. COPLEY, Univ. of Southern California, School of Engineering, *Los Angeles, California* 90007 (AF-AFOSR-2766-75)

The need for a low density replacement for nickel-base alloy disks and blades in the terminal stages of compressors in gas-turbine engines has been pointed out in Air Force Research Objective 2.1.1.2. Precipitation strengthened beta-titanium alloys are a promising new type of alloy that warrants further investigation as a potential replacement alloy. However, very little is known about the physical metallurgy of such alloys. The objective of this research is to obtain an understanding of phase equilibria and the interrelationship of microstructure and properties in beta-titanium solid solutions strengthened by the precipitation of intermetallic compounds. This understanding is essential to fully assess their potential as gas- turbine materials and, if warranted, to facilitate their development for high temperature applications. Specifically, this is a basic investigation of phase equilibria in the Ti-Mo(V)-Cr-Al quaternary system. Of particular interest are the stability limits of the beta solid solution and the boundaries of the beta-gamma (TiAl) phase field. The approach includes microstructural analysis employing techniques such as transmission electron microscopy, x-ray analysis and electron probe microanalysis.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd, Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0005, DYNAMIC STUDIES OF LASER DAMAGE PHENOMENA IN MATERIALS
R.A. ARMISTEAD, Stanford Research Institute, *Menlo Park, California* 94025 (F44620-73-C-0019)

Fatigue, fracture, and damage by intense electromagnetic radiation must be evaluated to determine both the effectiveness of laser systems and the vulnerability of materials to laser radiation. New and improved techniques are required to observe laser-material interactions on the microscopic level. This research will use microscopic scans of material in place during damage production, permitting observation of the onset and growth of cracks and pits. This research will give the first known in-place measurement of damage produced by a high power laser, with time resolution of the damage growth. Used in conjection with an electron scanning microscope will be pressure sensors in the target material. During a laser pulse, the SEM will observe onset and evolution of microcracks and microcraters at the surface while the pressure sensors will monitor pressure pulses within the bulk material. Temperature sensors will permit the determination of coupling coefficients. Initial efforts on metals will be extended to study thin film dielectric coatings. Both AFML and AFWL will coordinate this research with their programs.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0006, HIGH TEMPERATURE DEFORMATION IN DISPERSION STRENGTHENED METALS
W.D. NIX, Stanford University, School of Engineering, *Palo Alto, California* 94305 (AF-AFOSR-2434-73)

The demanding requirements of high performance aerospace vehicles make clear the need for materials with mechanical properties yielding superior performance and extended life. Dispersion strengthened metals and alloys are being used in the hottest sections of some high performance gas turbine engines and their use is expected to become even more widespread in aerospace systems of the future. Thus, the phenomenon of dispersion strengthening is of considerable technological importance. The objective of this research is to obtain an understanding of the mechanisms that control high temperature deformation in metal single crystals containing non-deformable particles in the hope that such information will aid in understanding the complex mechanical behavior of commercial, polycrystalline, dispersion strengthened alloys. The present limited understanding of high temperature dispersion strengthening is based on theories which deal with the effects of particles on single crystalline matrices, while all experiments are on polycrystalline samples where grain boundary sliding and fracture are dominant. The additional presence of grain boundary effects in the experimental data has also confused the situation. To avoid the confusion and to better understand the mechanisms involved, the principal investigator is undertaking a study of high temperature dispersion strengthening of single crystals.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0007, MECHANICS OF COMPOSITE MATERIALS AND STRUCTURES
A.T. ELLIS, Univ. of California, School of Engineering, *San Diego, California* 92038 (AF-AFOSR-1957-70)

Composite materials are one of the most promising candidates for the structures and engines of advanced AF high performance vehicles. The goal of this effort is to achieve reliable stress prediction models and failure criteria for laminated and filamentary composites under both static and dynamic loading conditions. Previously developed theories of elastic-plastic wave propagation at finite deformations will be extended to a larger class of composite material geometries and material behavior. The domain of validity of theoretical wave propagation models will be checked by correlation with experimental data. Predictions will be made for the accumulated damage and reduced moduli for structural elements following passage of damaging waves resulting from, say, bird strikes on jet engine blades or radiation absorption in heat shields. Attenuation and dispersion studies are planned for various composites, including porous composites. The degree and type of internal damage suffered by a composite will be found by the use of improved ultrasonic holography employing newly developed very large amplitude sound waves at about 100 MHz. Frequencies in this range should result in acoustic pictures of unparalleled quality.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0008, SYNTHESIS AND METALLURGICAL PROPERTIES OF INTERMETALLIC COMPOUNDS
G.W. WEBB, Univ. of California, Graduate School, *San Diego, California* 92038 (AF-AFOSR-2664-74)

New approaches to Air Force guidance, navigation, remote sensing and detection of electromagnetic radiation, magnetohydrodynamic power and propulsion depend upon new and improved superconducting materials. The objective of the research is to apply low temperature (below 1000 degrees C) growth techniques such as vapor transport, liquid phase transport, fused salt bath reaction or sputtering to the synthesis of niobium rich binary compounds of germanium, silicon, antimony or gallium. The major concern is on metallurgical techniques which can be adopted to the preparation of superconducting materials with superior physical properties, namely, high critical transition temperature (above 20 degrees K), high uppercritical magnetic fields

and high current- carrying capacity. Such engineeringly useful materials are needed for the timely exploitation of the phenomenon of superconductivity for aerospace applications.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0009, OXIDE SCALE ADHERENCE MECHANISMS
F. PETTIT, United Aircraft Corporation, *Hartford, Connecticut* 06118 (F33615-72-C-1702)

AF function - high temperature propulsion materials. Deficiency - physical and chemical property degradations of alloys due to oxidation at high temperatures. Research - the adherence mechanism(s) of alumina on nicral and cocral alloys with and without yttrium additions will be determined under normal oxidizing conditions and in the presence of applied tensile and compressive loads. How research contributes - an understanding of the affect on scale adherence of the alloy structure and composition and the resulting oxide growth mechanisms and morphology can lead to controlling the adherence of oxide scales and thereby to the use of desirable alloys previously discounted because of poor scale adherence. The evaluation of the effect of applied stress during oxidation may well lead to a better understanding of alloy behavior during actual use, since in practice most high temperature alloys are subjected to loads during exposure to the degrading environment.

Isothermal and cyclic oxidation kinetics of the various alloys will be determined and combined with detailed microstructural analyses to evaluate the scales formed and their adherence mechanisms.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0010, HOT CORROSION OF COBALT ALLOYS
F. PETTIT, United Aircraft Corporation, *Hartford, Connecticut* 06118 (F33615-72-C-1757)

AF function - high temperature propulsion materials. Deficiency - mechanical and chemical property degradation of alloys due to induced accelerated oxidation at high temperatures. Research - the hot corrosion mechanisms of several cobalt-base alloys will be determined and compared to the mechanisms for similar nickel-base alloys to define the reasons for the increased resistance to hot corrosion by cobalt alloys. How research contributes - an understanding of the oxidation and hot corrosion mechanisms of cobalt-base alloys and a comparison to the mechanisms for nickel-base alloys can lead to improving the resistance of one or both alloy types and thereby to longer life of these alloys as gas turbine components.

Comparison will be made of the oxidation kinetics and microstructures obtained from the oxidation of sodium sulfate free and sodium sulfate-coated specimens, the oxidation of specimens in sulfur dioxide, and observations will be made with a hot stage microscope during accelerated oxidation.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0011, SOLID MECHANICS OF FLOW AND FRACTURE
C. RAU, United Aircraft Corporation, *Hartford, Connecticut* 06118 (F33615-73-C-4072)

AF function - advanced aerospace vehicles. Deficiency - reliability and failure predictability of structural materials. Research - detemine microstructural/property relationships. How research contributes - accurate structure/property theories and equations will allow more exact design with consideration of a wider range of operating conditions.

Various mathematical/structural models for yielding, flow, and fracture are developed for two phase alloys. The models are then evaluated analytically and numerically and the predicted behavior is compared to available mechanical properties.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0012, INTERFACIAL CHEMICAL REACTIONS IN FLOW SYSTEMS
D.E. ROSNER, Yale University, School of Engineering, *New Haven, Connecticut* 06520 (AF-AFOSR-2487-73)

This work supports research objectives 4.2, 5.1, and 2.2 through the examination of chemical reactions at surfaces and phase transformations which play a major role in a wide variety of technological areas of interest to the USAF. These include the ablation of heat shields, the chemical erosion and sublimation of rocket throat materials, the design of hybrid and solid rocket combustion chambers, the development of reactors for fabrication of laboratory testing of refractory metals and refractory metal protective coatings for systems operating at hypersonic velocities. In the present program, theoretical and experimental methods are being combined to enlarge the understanding of the rates of important chemical surface reactions and phase transformations. In particular, in the theoretical studies, emphasis is being placed on (1) nucleation in boundary layers and wakes, (2) droplet evaporation and combustion phenomena, (3) diffusion limited rates of phase change, (4) apparent kinetics of surface reactions as influenced by fluid phase or solid phase diffusion. In the experimental studies of atom/solid reaction kinetics at elevated temperatures emphasis is being placed on (1) the dissolution of nitrogen and oxygen in refractory metals, (2) kinetic coupling phenomena for refractory solids attacked by dissociated gas mixtures (eg, N plus O) or in the presence of simultaneous dissolution and oxidation, (3) simultaneous dissolution and oxide volatization (eg, the O/TA system), and (4) correlation of experimental results with relevant chemical properties of the reactants and products.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0013, FATIGUE DAMAGE BEHAVIOR IN COMPOSITE MATERIAL
M.J. SALKIND, Sikorsky Aircraft, *Stratford, Connecticut* 06602 (F44620-73-C-0043)

Advanced AF aerospace vehicles require high strength, lightweight structures with superior ability to withstand fatigue. The use of composite materials show increasing promise of meeting these requirements. However, improved criteria for the nondestructive detection of fatigue damage initiation and growth are needed. This effort is directed to providing a foundation for fatigue design based on detected changes in structural characteristics (e.g. stiffness) and to provide criteria for in-service inspection and removal of fatigue critical composite structures. Although fatigue behavior varies for different laminate orientations and fibrous materials, this effort is confined to two material systems, one of particular value for composite rotor blades. Progressive fatigue damage is determined through nondestructive and destructive evaluation of static and fatigue tested composite tubes. Part of the investigation will consist of continuous monitoring of axial modules change during fatigue coupled with a number of NDT techniques and with destructive evaluation at each of three progressive damage increments determined from previous test data and at fracture or run-out to ten million cycles. The destructive tests will verify NDT damage indications, identify failure mechanisms, and determine extent of damage. Correlation will be obtained between NDT indications, actual damage, and changes in stiffness.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0014, ANALYSIS AND DESIGN OF COMPOSITE BONDED JOINTS UNDER A DYNAMIC TYPE LOAD
J.R. VINSON, Univ. of Delaware, School of Engineering, *Newark, Delaware* 19711 (AF-AFOSR-2739-74)

Air Force flight vehicles require improved structural efficiency and life cycle reliability to achieve future mission profiles. Structural designs utilizing composites are clearly indicating improved structural efficiency over conventional metal design. Joint designs for both primary and secondary load paths are of critical importance to incorporating the material into AF vehicles. This

project is investigating the static and fatigue behavior of bonded composite joints. Both analytical and experimental tasks are being undertaken. Composites that are under study are PRD49 and graphite. Bonding adhesives included in the study are EA951, EA9628 and EA2216.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0015, STRUCTURE AND PROPERTIES OF GLASSES
P.B. MACEDO, Catholic University of America, School of Engineering, *Washington, District of Columbia* 20017 (AF-AFOSR-2203-72)

From a practical standpoint this research proposal bears on three areas of technology relevant to Air Force problems. These are the development of optical fiber transmission lines for communication and air born control systems, the chemical and thermal tempering of glass for high strength impact resistant airborne windows and the behavior of lubricants in high speed jet engines impeded by specific gaps in basic understanding. It is proposed to undertake a basic research program to overcome these gaps. In this program, three principal lines of research stand out as distinguishable units. These include (1) investigation of light scattering mechanisms in molten and solid glasses, (2) study of the reduction in optical losses and radiation sensitivity due to reduction in transition metal impurities in glasses by selective leaching of a phase separated glass composite, and (3) study of ionic motion in molten salts, glass, liquids and oils. Each bears on the fiber optic problem while the chemical and thermal tempering problem is concerned with the third.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0016, FRACTURE OF BRITTLE MATERIALS AT HIGH TEMPERATURES
A.G. EVANS, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

AF function - advanced aerospace vehicles. Deficiency - reliability and failure predictability of structural materials. Research - determine high temperature fracture properties of brittle materials. How research contributes - knowledge of fracture properties will provide basis for exact design criteria.

Novel apparatus has been designed and constructed to measure various crack propagation and fracture mechanics parameters in air to 1400 degree C. Measurements on a wide variety of materials can be made.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0017, THERMAL EXPANSION
T.A. HAHN, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Washington, District of Columbia* 20234

Current activity on standard reference materials for thermal expansion are progressing with measurements in FY 74 on tungsten and stainless steel. Plans for FY 75 include work on sapphire and aluminum alloy SRM's and continuation of the development of new instrumentation and the critical evaluation of data.

Objective: The long range objectives are to obtain accurate data on the thermal expansion of materials, to develop measurement techniques, and to promote uniformity in data on thermal expansion. The current objectives include the measurement and certification of the thermal expansion of selected materials for use as reference materials.

Motivation: Accurate information on thermal expansion is needed by those industries (aerospace, transportation, energy, materials, etc.) where thermophysical properties are a necessary part of the applied technology or manufacturing requirements. Standard reference materials and standard reference data will help provide this information and in general will promote uniformity of physical measurements.

Approach: Eight materials (copper, fused silica, borosilicate glass, tungsten, stainless steel, aluminum alloy, sapphire and graphite) have been selected that provide a wide variety of thermal and chemical behavior but are stable and homogeneous. The thermal expansion of these materials will be measured with apparatus of proven accuracy over a wide range of temperatures. These reference materials will be used by industrial and academic laboratories to calibrate their equipment.

Progress: This past fiscal year, measurements were made on samples of tungsten and stainless steel. New measurements were made on copper at temperatures above 700 K to check on the possibility of mechanical creep in the certified values. Intercomparisons were made between copper, fused silica and borosilicate glass in order to evaluate various methods of using these reference materials. Polycrystalline graphite was studied for homogeneity and stability. The construction of a high- precision dilatometer was completed and the design of a high-accuracy polarizing interferometer was initiated. Measurements were also made on Cu20, a material that is used in solar energy conversion. ACtivities on the critical evaluation of data on the thermal expansion of the elements and selected compounds are covered by the Section Project Report on Data Compilation (Project No. 3130167).

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

3.0018, ADVANCED LUBRICANTS
H. RAVNER, U.S. Navy, Research Laboratory, *Washington, District of Columbia* 20390

The objective of this program is to generate information required to improve present Naval aircraft gas turbine lubricants and additives, to provide the chemical basis for development of advanced lubricants for future higher-output aircraft engines, and to ensure compatibility of present and future lubricants with engine components and environments.

Materials potentially useful as high-temperature (to 400 deg C) aircraft turbine lubricants are studied to ascertain their thermal/oxidative/hydrolytic stability and other pertinent physicochemical properties. Additives to enhance lubricant esistance to environmental stress, to increase operational life, and to improve lubrication are investigated and evaluated. Information so derived is used for the development of improved high temperature turbine lubricants for military and civilian aircraft.

Supporting agency address information: Naval Air Systems Command (AIR 330), Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

3.0019, ALLOYING STUDIES OF MATERIALS
M.E. FINE, Northwestern University, School of Technology, *Evanston, Illinois* 60201 (AF-AFOSR-2431-73)

A rational basis for materials development is required to assure the availability and effective utilization of structural materials in future Air Force systems. The development of improved materials as well as the fundamental understanding of their behavior is essential to superior operation in the aerospace environment. The principal aim of this research is to relate the properties of materials to their microstructure and thereby learn how to optimize and control desired properties. Most frequently this optimization requires alloying or mixing of substances. The objective of this research is to investigate the basic property-structure-alloying relations and the theory of these relations in two areas - fatigue resistance of aluminum alloys, and fracture resistance of ceramics with dispersed metallic phases. In both of these the same tools are used to determine the structure - transmission, replica, and scanning electron microscopy, optical microscopy, and x-ray diffraction. Furthermore, the same microstructural elements are important - point defects, dislocations, grain boundaries and second phases, their size and distribution. The point of view adopted has been to select important areas where critical experiments show high promise of leading to a breakthrough in the understanding of the property-structure-alloying relations.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0020, HIGH PRESSURE NUCLEAR MAGNETIC RESONANCE RELAXATION STUDY OF SUPERCRITICAL DENSE FLUIDS

J. JONAS, Univ. of Illinois, Graduate School, *Urbana, Illinois* 61801 (AF-AFOSR-2286-72)

The relevance to the Air Force of basic research on the properties and structure of liquids lies in the utilization of liquids as hydraulic fluids, fuels and propellants both normal and cryogenic. The structure of liquids are also intimately related to the structure of glasses. As an extension of the earlier NMR relaxation studies at high pressures it is planned to measure the spin-lattice relaxation times and the self- diffusion coefficients in the supercritical dense fluids. In a systematic way it is hoped to draw some general conclusions about the mechanism of diffusion and reorientation of molecules in the supercritical dense region. The measurements in the supercritical fluids over a wide range of densities up to typical liquid densities are of a particular interest. The emphasis will be on the following main projects - (1) the relationship between the angular momentum correlation time and the angular reorientation correlation time, (2) the temperature behavior of the angular momentum correlation time at constant density and its theoretical prediction from the hard sphere theory of fluids, (3) the determination of density and temperature effects on the detailed time dependence of the reorientational correlation functions as obtained by analysis of Raman band shapes, (4) to establish good experimental basis to test various theories for self-diffusion in fluids. Future studies are hoped to lead to knowledge of the formation of microphases in glasses for optical fibres.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0021, THEORETICAL AND QUANTUM CHEMISTRY OF ENERGETIC LIGHT METAL COMPOUNDS AND BORIDES

J.J. KAUFMAN, Johns Hopkins University, School of Arts, *Baltimore, Maryland* 21218 (F44620-69-C-0110)

Missile and weapons delivery depends primarily on chemical rocket propulsion. Today's limitations on speed, range or payload can be overcome by finding new, higher-energy propellant ingredients and new structural materials to withstand the resulting higher temperatures. Reliable theoretical predictive methods are needed to guide the experimental search. This research is directed toward derivation and application of basic theoretical concepts leading to calculational techniques for prediction of such chemical and physical properties of energetic and refractory species as their possible existence and relative stability, bonding, charge distribution and their relationship to experimentally observed properties. It will include research in development of theoretical methods and computer programs to describe structures and stabilities of compounds including a series of unique energy-rich electron deficient boron molecules and of refractory borides. These methods and programs are being developed as general procedures. They include rigorous LCAO-MO-SCF calculations using either slater-type or gaussian basis orbitals, semi-empirical LCAO-MO-SCF calculations, ab initio configuration interaction techniques and the use of atomic crystal functions to construct crystal orbitals for the calculations involving the refractory borides.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0022, STATIC AND DYNAMIC NONLINEAR STRUCTURAL PROBLEMS

T.H. PIAN, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (F44620-72-C-0018)

Operational Air Force flight vehicles and those now being designed are receiving heavy emphasis of service life goals. A major part of designing a structure to a given service life resides in knowing an initial flaw size and the stress intensity at the tip of the flaw. From the intensity of the stress level and laboratory data reasonable predictions can be made as to crack initiation and propagation rates. The proposed effort at MIT under Dr. Pian will extend the hybrid finite element model currently used in fracture mechanics to predict stress singularities or intensity factors. The current program will (1) develop a hexagonal element with included crack for three dimensional analysis, (2) extend the two-dimensional hybrid element to consider steady state creep behavior and (3) extend three dimensional hybrid element models to consider materials such as solid propellants and the interlaminate stresses in composites.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0023, INVESTIGATION OF DYED SYNTHETIC FIBERS AS INDICATORS OF PHOTO DETERIORATION OR DEGRADATION OF FIBROUS SUBSTRATES

E.B. GARBER, U.S. Army, Natick Laboratories, *Natick, Massachusetts* 01760

Development of a means for assessing levels of deterioration of fibrous substrates in parachutes, tents and load carrying equipment.

A. Determine influence of temperature and atmospheric diluents on photo degradation of fibrous substrates. B. Determine relationship of color degradation of dyed synthetic fabrics to substrate deterioration.

Supporting agency address information: Troscom Natick Laboratories, Natick, Ms. 01760

SUPPORTED BY U.S. Dept. of Defense - Army

3.0024, BI-CASTING SUPERALLOYS FOR RADIAL TURBINES

D.A. COLLING, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

Bi-casting of radial turbine components using superalloys is proposed for Army engines. The object of this research is to solve the interfacial bond problem encountered in bi-casting of hub and blades and to determine the conditions which yield optimum superalloy metallurgical structure.

The approach of this research will be to address the interfacial bond problem, to determine the microstructure of cast and heat treated bicastings including grain size, concentration and distribution and carbide morphology and to determine the feasibility of ESR for controlling hub microstructure.

Supporting agency address information: AMC Materials and Mechanics Research Center ATTN-AMXMR-ER, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0025, MICROSTRUCTURE AND PROPERTIES OF SPECIALLY PROCESSED STEELS

C.F. HICKEY, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The objective of this investigation is the optimization of the ballistic and mechanical properties of armor by utilizing steel produced by special processes such as electro-slag-remelt (esr), vacuum induction melting (vim) or vacuum arc remelt (var). In general, the ballistic properties of steel increase with increased strength (hardness) to some inherent limit for a specific material. This limit is dependent on material toughness for specific environmental conditions. These specially processed steels have improved toughness. Any increase in toughness would permit utilization at higher strengths or severe environmental conditions. In addition, this would also permit increased ballistic protection to critical components such as landing gears, drive shafts helicopter masts, wing boxes on aircraft, and spars of helicopter blades. This effort is aimed at determining the microstructure which produces optimum properties in these specially processed alloys through controlled heat treatment. This should provide a means of enhancing aircraft survivability and combat vehicle protection.

Determinations of both strength and toughness of specially processed 4340 steel after various combinations of thermal treatments will be made. This will provide data for optimum utilization of this steel for both armor and ballistically tolerant components. Emphasis will be placed on both high and medium strength levels.

Supporting agency address information: AMC Materials and Mechanics Research Center AMXMR-EM, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0026, DEVELOP OF SURFACE TREATMENT FOR UNIFORM CASE DEPTH HARDENING OF X-2 ALLOY GEAR STEELS
M.M. JACOBSON, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To develop a carburizing treatment for X-2 alloy tool steel for use as a gear material for helicopter transmissions.

Alloy steel vasco X-2 and another candidate advanced gear material of vacuum melt grade will be heat-treated and gas carburized under controlled laboratory conditions utilizing various pretreatments to mitigate the adverse effect of chromic oxide scale utilizing mechanical, chemical or electrochemical means. Evaluation of uniformity of case depth as well as mechanism and effectiveness of pretreatments will be made using metallography, scanning electron microscopy, and other techniques.

Supporting agency address information: AMC Materials and Mechanics Research Center ATTN-AMXMR-EM, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0027, COATINGS FOR GAS TURBINE ALLOYS
M. LEVY, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To develop improved coatings for titanium alloys, nickel-base superalloys and columbium alloys, for application in the compressor and turbine sections of gas turbine engines in order that higher turbine inlet temperature and increased time-between-overhaul be obtained.

Diffusion coatings based on various combinations and compounds of elements such as aluminum, boron, carbon, cobalt, chromium, iron, manganese, nickel, and silicon, will be applied to candidate gas turbine alloys utilizing electrophoresis plus compaction and diffusion treatments. A full factorial experiment will be performed for each coating system in order to evaluate the effect of layer composition, diffusion temperature, and coating thickness on the following depending upon the component application- erosion, fatigue, hot salt stress corrosion, oxidation resistance (isothermal and cyclic) and sulfidation resistance (utilizing the dynamic hot corrosion test rig). The capability to coat complex geometries will be demonstrated.

Supporting agency address information: AMC Materials and Mechanics Research Center, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0028, CHEMICAL CHARACTERIZATION OF SILICON NITRIDE
H.F. PRIEST, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The technical objective is twofold- to determine the impurities present in silicon nitride prepared in a variety of ways, how these impurities interact with each other and with the matrix and how silicon nitride can be prepared free of degrading impurities- to develop rapid, non-destructive 14 MeV neutron and/or high energy photon activation analysis techniques.

The major emphasis will be on silicon nitride for ceramic engine application where the major technical barriers are obtaining starting materials of sufficient purity, producing materials of known composition, theoretical density and sufficient strength, and characterizing the materials and evaluating all parameters to determine if the needed quantum jumps in properties can be obtained. Especial emphasis will employ the unique AMMRC 14 MeV Activation Analysis System to study the oxidation mechanism of silicon nitride and (sialon). Mass spectrometry, and infrared will be used in this research, which will be carried out at AMMRC, to help characterize the reactions and products.

Supporting agency address information: AMC Materials and Mechanics Research Center, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0029, FATIGUE BEHAVIOR OF FIBER REINFORCED COMPOSITES
D.K. ROYLANCE, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

To assess the influence of an accelerated environment (high temperature, humidity, and ultraviolet radiation components) on the fatigue lifetime of fiber-reinforced polymer composites, to identify material degradation mechanisms, and to optimize the environmental fatigue resistance of these composites for use in helicopter rotor blades and in flight control elements. Pacing problem areas (from FY75 guidance, materials technology plan for - aircraft)- 1.5, 1.6, 2.1, 2.2, 2.3, 2.4, 2.8, 9.1, 9.2. Major program thrust- 4.g (aircraft survivability).

Various thermosetting and thermoplastistic matrices, reinforced with glass, graphite, and kevlar fibers, will be subjected to cyclic tension - tension fatigue loads while exposed to an accelerated deteriorative environment. Statistical lifetime distributions will be obtained as a function of mean load, and the data correlated with current theories of cumulative damage and crack growth in composites. Materials deterioration mechanisms will be identified by analytical chemical and microscopy techniques, and processing methods will be developed to eliminate or minimize these mechanisms.

Supporting agency address information: AMC Materials and Mechanics Research Center AMXMR-RD, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0030, MECHANICAL LOSS MONITORING OF COMPOSITE MATERIAL DETERIORATION
M.E. ROYLANCE, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

This project will employ dynamic mechanical loss spectroscopy as a powerful means of monitoring accelerated environmental deterioration in engineering composites and identifying the materials mechanisms operative during environmental attack. This technique is capable of very sensitive measurements of changes in mechanical loss and storage moduli, and these changes can be identified with material transitions related to matrix molecular mobility, fiber-matrix interfacial damping, and dynamic energy absorption capability. The kinetics of the deterioration mechanism will be characterized to permit extrapolation of the accelerated data to real-time outdoor weathering, and knowledge of the responsible mechanism will be used to devise rational means of presenting or minimizing it. During exposure, the specimen will experience cyclic tensile stresses of frequencies near those present in helicopter rotor blades and control elements, and the resulting data will be in direct support of rotary-wing aviation systems. Major program thrust aircraft survivability.

Specimens will be prepared of engineering composites used or projected for use in current or future helicopter systems- primarily continuous glass, graphite, and kevlar fibers in epoxy matrices. A force oscillation dynamic viscoelastometer will apply a cyclic tensile load at approximately 100 Hz to the specimen while exposed to an accelerated deteriorative environment (high temperature and humidity)- damping and storage moduli will then be monitored as functions of time. Deterioration mechanisms will be identified by correlations with mechanical loss temperature spectra, scanning microscopy, and chemical analysis. Specimens will be studied as a function of processing parameters to permit optimization of processing for deterioration prevention.

Supporting agency address information: AMC Materials and Mechanics Research Center ATTN-AMXMR-RD, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0031, STRESS CORROSION AND HYDROGEN EMBRITTLEMENT OF ESR AND MARAGING STEELS
A.K. WONG, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

Determine and evaluate factors affecting the stress corrosion characteristics and mechanical properties of ultrahigh strength alloys such as ESR and maraging steels for missile aircraft and armor applications. In addition, the potential deleterious effects

of conventional surface treatments and hydrogen embrittlement will be investigated. Maraging steels are currently used in components such as rocket motor cases, drive shafts, landing gear parts, pins and hinges. ESR steels have demonstrated potential as vehicular armor.

Solution treated 250 and 350 grade maraging steel sheets will be subjected to selected thermomechanical treatments approximating conditions encountered during fabrication of missile components. Mechanical properties and stress corrosion cracking characteristics (e.g., KQSCC) will be determined. Also, the stress corrosion characteristics of armor-grade ESR steels will be determined. Either distilled water or aqueous NaCl environments will be employed. Further, the effects of various conventional metal surface treatments on the properties of both ESR and maraging steels will be assessed along with experimental studies of related hydrogen embrittlement phenomena. Modes of SCC failure will be determined by examination of fracture surfaces utilizing replica electron microscopy techniques.

Supporting agency address information: AMC Materials and Mechanics Research Center AMXMR-EM, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

3.0032, FATIGUE CRACK PROPAGATION IN TITANIUM ALLOYS

D.A. KOSS, Michigan Technological Univ., School of Engineering, *Houghton, Michigan* 49931 (AF-AFOSR-2596-74)

The longevity, reliability and safety of aerospace structures are related to the fatigue properties of the structural materials used. In fact, the fatigue properties of structural materials often limit their application. Thus, it is important to understand the mechanisms of fatigue and especially the metallurgical means by which fatigue resistance may be improved. The objective of this research is to examine the criterion for stage I fatigue crack propagation (that which occurs initially along crystallographic slip planes) and to determine the effect of materials parameters on these criterion in single phase BCC and HCP titanium alloys. In addition to obtaining the relationship between crack propagation rates, applied stress, and crack length, this study will explore the effects of grain size, texture, slip character, and stress-strain behavior on stage I crack growth. By better understanding of the influence of metallurgical parameters on fatigue crack propagation, guidelines for better fatigue resistance of structural alloys may be established.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0033, STRAIN-RATE EFFECTS IN METAL FATIGUE

J.R. HANCOCK, Midwest Research Institute, *Kansas City, Missouri* 64110 (F44620-72-C-0027)

The strategic, tactical, and logistic requirements on the AF require reliable high speed aircraft. Metal fatigue, however, still accounts for perhaps the majority of service failures. The development of fatigue resistant materials would help alleviate this problem. Guidelines for the material developer and design engineer should include the effect of strain-rate on fatigue life and fatigue crack growth rates. This is an important variable because an aircraft is subjected to a wide spectrum of loads and frequencies. The current research will determine whether strain-rate dependence of the cyclic strain-hardening exponent (from the equation for the cyclic stress-strain curve) can provide reliable, quantitative predictions of the effect of strain rate on the rate of fatigue crack growth and the fatigue lives in a variety of metals. In general, those materials showing significant effect of strain rate on the cyclic strain hardening exponent will be selected for further study.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0034, STATISTICAL MECHANICS FOR CALCULATION OF THERMAL, MAGNETIC, ELECTRICAL AND MECHANICAL PROPERTIES OF MATERIALS

J.L. LEBOWITZ, Yeshiva University, School of Science, *New York, New York* 10033 (AF-AFOSR-2430-73)

The development of new and improved Air Force systems is to a significant extent contingent on a better understanding and control of the properties of macroscopic matter. This effort is contributing to this goal by conducting research in statistical mechanics aimed at elucidating how the observed thermal, magnetic, electrical, and mechanical characteristics of matter depend on its microscopic properties. Specific topics under current investigation include - (1) the modeling and computer simulation of phase separation in alloys (spinodal decomposition) a process which determines their microstructure and hence their macroscopic properties, (2) the generalization of proven models of simple fluid behavior to more complex mixtures with non- additive diameters, electrolytes and polar fluids, (3) transport properties of disordered systems, (4) studies in non-equilibrium statistical mechanics related to the derivation from first principles of exact kinetic equations which would, for example, provide a means to describe the properties of liquids and dense gases, and (5) determinations of the validity of models, such as the Ising spin system for describing magnetic behavior and liquid-gas transitions.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0035, PIEZO-OPTICAL CHARACTERIZATION OF DEFECTS AND IMPURITIES IN INFRARED MATERIALS

P.M. RACCAH, Yeshiva University, Graduate School, *New York, New York* 10033 (AF-AFOSR-2714-74)

Aerospace functions of reconnaissance and surveillance can be expected to be greatly enhanced by research in materials suitable for development of new or improved infrared detection in both the 3-5 and 8- 14 micrometer ranges. The objective of this research program is to study defects, impurities, and non-stoichiometry in a material such as mercury cadmium telluride to determine their role in the detection process. Notwithstanding a considerable amount of work on the subject by conventional methods, little is known concerning the microscopic electronic properties of these defects. This program is a systematic study by standard and modulated optical spectroscopy of the optical response of lattice defects and chemical impurities to isotropic or anisotropic modifications of the crystalline potential achieved by applications of uniaxial and hydrostatic pressure. This experimental approach, together with theoretical analysis, is expected to yield information on the material science of narrow band-gap materials and thus to contribute to the technology of infrared detectors.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0036, STRESS CORROSION SUSCEPTIBILITY IN HIGH STRENGTH ALUMINUM ALLOYS

F.H. COCKS, Duke University, School of Engineering, *Durham, North Carolina* 27706 (AF-AFOSR-2632-74)

Fundamental knowledge of the effect of chemical, electrochemical, mechanical and metallurgical influences on load-bearing capability of structural materials is required to assure the availability and effective utilization of superior materials in future aerospace systems. Knowledge of the metallurgical basis of stress corrosion susceptibility is crucial to both the fundamental understanding of stress corrosion processes and to rational alloy development. Furthermore, this improved understanding of the metallurgy of high strength aluminum aircraft alloys can be expected to lead to improvements in other properties such as resistance to fatigue damage. The objective of this investigation is the establishment of quantitative relationships between stress corrosion and the detailed physical metallurgy of precipitates, dislocation structures, matrix properties, and grain boundaries. The influence of alloying additions on these properties will also be examined.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0037, EFFECTS OF INTERSTITIAL AND SUBSTITUTIONAL ALLOYING ON DISLOCATION STRUCTURES AND MECHANICAL PROPERTIES
T.E. MITCHELL, Case Western Reserve Univ., School of Engineering, *Cleveland, Ohio* 44106 (AF-AFOSR-2126-71)

Aircraft landing gears, and the high temperature portions of turbine and rocket propulsion systems require properties which are exhibited primarily by metals having the body centered cubic (BCC) crystal structure. It is important to know not only why this particular crystal structure in metals has served so well but also what other features of this class of materials might be further exploited to the benefit of the Air Force. Considerable controversy surrounds the question of the relative importance of the intrinsic strength (due to the Peierls Stress) and the extrinsic strength (due to interstitial impurities) in the strength of BCC metals. However, recent experimental results leave little doubt that both mechanisms are important so that the real question is how these mechanisms add or interact to give a particular material its mechanical properties. Experiments are in progress with pure Ta-N and Ta-Re alloys. Mechanical properties are being measured and slip systems are being investigated as a function of orientation in order to characterize the slip asymmetry. Dislocation dissociations are being investigated in the same materials. The results are being combined with theoretical investigations of dislocation structures and solute interactions in order to advance our understanding of the strength of BCC metals and alloys.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0038, HIGH TEMPERATURE CREEP OF CERAMICS
M.S. SELTZER, Battelle Memorial Institute, *Columbus, Ohio* 43201 (F33615-73-C-4111)

AF function - high temperature materials, advanced propulsion systems. Deficiency - failure to accurately predict behavior of materials in high temperature environments due to lack of requisite property data. Research - creep studies will be performed to determine mechanisms and constitutive equations to predict the high temperature deformation behavior of stabilized ZrO2 and Si3 N4 - Al2 O3 materials. How research contributes - this research will allow accurate predictions of the creep behavior of stabilized ZrO2 and Si3 N4 - Al2 O3 in high temperature environments. This will lead to increased refractory lifetime in blow-down wind tunnel storage heaters and evaluation of new materials for future high performance AERO propulsion systems.

High temperature creep tests in conjunction with careful characterization of the composition and microstructure of the specimen both before and after testing will be used to determine the creep behavior of these materials.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0039, SURFACE PROPERTIES OF METALS
J.P. HIRTH, Ohio State University, School of Engineering, *Columbus, Ohio* 43212 (AF-AFOSR-2242-72)

Materials technology, broadly applicable to aerospace operations, relies substantially on the properties of interfaces. The role of microstructure and the physical and chemical properties of thin films formed as a result of interaction of metal and alloy surfaces with the environment is crucial in determining the subsequent oxidation, corrosion, and mechanical failure of the material. This research deals with the fundamental structure and energetics of metal surfaces, the influence of surface environment on mechanical properties, and the related theories of surface films and of dislocation interactions at the surface. Specifically, the objective of this investigation is to measure surface energies, the formation and properties of thin films, and the influence of adsorbates on such properties. Practical applications are anticipated for materials exposed to aerospace environments, and to the important problems of corrosion, stress corrosion and oxidation. Ancillary results on the properties of internal interfaces can be expected to provide information on the influence of interfaces on mechanical properties and fatigue.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0040, TRACE ANALYSIS FOR METALS IN AEROSPACE MATERIALS BY GAS CHROMATOGRAPHY
W.O. ROSS, Monsanto Research Corporation, *Dayton, Ohio* 45407 (F33615-72-C-1304)

AF function - flight operations, Air Force pollution problems, propulsion. Deficiency - aerospace materials do not presently meet the stringent performance requirements with respect to their properties. Research - will develop new analytical methodology for aerospace materials currently used or projected for use in a variety of Air Force weapon systems. How research contributes - will apply electron capture gas chromatography to many Air Force materials characterization problems and Air Force environmental pollution analysis problems.

Electron capture gas chromatography and gas chromatography coupled with mass spectrometry will be applied to Air Force problems of materials characterization and environmental pollution. Evaluation and characterization of a new microwave emission detector for gas chromatography will continue.

Supporting agency address information: Aerospace Research Laboratory LJ, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0041, INTERACTION OF CERAMICS WITH HIGH TEMPERATURE ENVIRONMENTS
H.C. GRAHAM, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - advanced aerospace vehicles. Deficiency - materials presently used in thermal protection at very high temperatures are stable for only very short times. Research - study of the oxidation behavior of ceramic materials which may be usable at temperatures greater than 1200 degrees C. How research contributes - understanding of oxidation behavior of candidate ceramic materials will aid the development of improved materials and be useful in design of such components as nose cones, leading edges and rocket nozzles.

The reactive behavior of materials of immediate interest - borides, nitrides and carbides sialons - will be characterized. The measurements of weight change, oxygen consumption, and vaporization rate, as appropriate, will be made under controlled thermodynamic conditions. Data will be combined with microstructural information and other determinations needed to fully characterize oxidation behavior. Initial materials to be studied include silicon carbide and silicon nitride, 50/50 m/o Sialon.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0042, TENSION PAD AND ADHESIVE EVALUATION TESTING
T.F. HUGHES, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Current aircraft structural integrity testing requires the use of small tension pads bonded to the test article with room temperature vulcanizing silicone adhesives. This program will investigate the use of high strength and deep curing silicone adhesives to allow the use of large tension pads. The use of large pads and high strength adhesives will reduce test program costs by reducing load linkage and manpower requirements in the setup phase of the program.

Commerically available silicone adhesives will be evaluated for bond strength with different size tension pads and on different materials, i.e., aluminum, titanium, and fibrous composites.

Supporting agency address information: AF Flight Dynamics Laboratory FBT, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0043, IMPROVED RANDOM FATIGUE FAILURE PREDICTION OF FILAMENTARY COMPOSITE MATERIALS AND STRUCTURES FOR MILITARY AEROSPACE VEHICLES

R.D. JOBLOVE, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Cumulative damage methods (such as Miners' Rule) for predicting the random load fatigue failure of military aerospace structures and materials are extremely poor, particularly when applied to composite materials and structures. Work done on contract showed the order of load application to greatly influence the life of composite joints. Therefore, a new analytical method for random fatigue failure prediction must be developed. Attaining this more accurate method will mean more efficient joint design. This in turn, means less excess weight added for 'safety', and, therefore, less structural cost as well. The improved confidence in the joint design will also mean less time consumed during maintenance as the joints may be inspected less often. Retaining the use of simply obtained s-n data is the prime objective for this effort.

Existing methods will be examined and manipulated to determine if a relatively simple change or additon can be utilized to effect sufficient accuracy. The basic loading input nature will be investigated to attempt to determine how best to formulate a new or improved cumulative damage method. When a new method is formulated, it will be checked against previously existing test results, if possible. Carefully controlled tests will then be performed for final verification, modification, or rejection of the new method.

Supporting agency address information: AF Flight Dynamics Laboratory FBS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0044, RELATION OF MICROSTRUCTURE TO BULK PROPERTIES OF STRUCTURAL ALLOYS

H.A. LIPSITT, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - advanced aerospace vehicles. Deficiency - thermomechanical processing, creep, and high temperature failures of structural materials. Research - multiphase materials will be examined to determine the influence of solid-solid phase boundaries as they relate to the properties of aircraft structural materials. How research contributes - this research makes possible the development of light, strong structural multiphase alloys with improved properties, bulk mechanical properties of structural metals and alloys are controlled by the nature of the phases present in the microstructure. Therefore, understanding and control of the characteristics of these phases leads to the attainment of high strength, structural stability, and improved elevated temperature mechanical properties.

Silver-nickel, aluminum-chromium and aluminum-zirconium alloys are being examined to determine the influences or second phases on thermomechanical processing and mechanical strength and creep properties. The Ag-Ni alloys are composed of two ductile phases whose phase compositions do not vary with temperature. The Al-Cr and Al-Zr alloys contain small, hard second phase particles in an aluminum matrix. Hardness, optical and electron microscopy, and deformation and creep studies are being considered.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0045, AEROSPACE MATERIALS AND METAL ANALYSIS

R.E. SIEVERS, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - flight operations, aerospace materials, propulsion, Air Force pollution problems. Deficiency - inefficient reversible molecular oxygen carriers. Inadequate methods for materials characterization. Inadequate techniques for measuring Air Force pollutants. Research - synthesis of new compounds with novel properties. Provides volatile metal compounds for vapor plating and new trace analysis methods. Provides data on metal chelates useful as molecular oxygen carriers. How research contributes - emphasis is placed on studies of metal chelate compounds that are volatile or are soluable in fuels such as JP-4 and aviation gasoline. The compounds have been demonstrated to be useful in vapor deposition processes which may provide improved refractory protective coatings for aerospace vehicles or new magnetic materials such as rare earth - cobalt magnets. Improved methods and instrumentation are being developed for the trace analysis of significant Air Force pollutants in support of project cone. More efficient compounds are being sought to be used as sources of oxygen in future emergency life support systems. Research support has also been given to the Spectroscopic Oil Analysis Program (SOAP).

Compounds having novel and potentially useful properties are being synthesized. Their properties are examined by a broad range of available instrumentation including GC, NMR, MS and TGA methods. Single crystal structure determinations are being undertaken to aid in understanding the relationships between molecular structure and properties. Methods and instrumentation will be developed for trace analysis of significant Air Force pollutants. New developments will be tested against previously accepted standards to evaluate the sensitivity, selectivity, and accuracy. Attempts are being made to improve the effectiveness of SOAP in predicting and preventing catastrophic engine failure.

Supporting agency address information: Aerospace Research Laboratory LJ, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0046, HIGH TEMPERATURE DEFORMATION BEHAVIOR OF CERAMICS

P.K. TALTY, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - high temperature materials, advanced propulsion systems. Deficiency - failure to accurately predict behavior of materials in high temperature environments due to lack of requisite property data. Research - high temperature property measurements will be performed on ceramic materials of interest such as ZrO2, Si3 N4-Al2 O3 materials to determine their high temperature behavior. How research contributes - this research will allow accurate predictions of the high temperature behavior of these materials leading to increased refractory lifetimes in blow-down wind tunnels, storage heaters, and evaluation of new materials for future high performance AERO propulsion systems.

High temperature measurements in conjunction with careful characterization of the materials before and after testing will be used to determine the high temperature behavior of these candidate materials.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0047, DEFORMATION AND FRACTURE STUDIES OF BICRYSTALS

Y.T. CHOU, Lehigh University, School of Engineering, *Bethlehem, Pennsylvania* 18015 (AF-AFOSR-2326-72)

The need for greater performance of aircraft will continue to push materials to higher strengths and less conservative use in design. For this trend to be successful in the future Air Force, the fundamental nature of materials behavior must be better understood. A basic element in the study of such materials behavior is the interaction between the grains forming the materials, and also the interaction between the dislocations and boundaries of the aggregate. A logical first step towards understanding these interactions is the study of the mechanical behavior of bicrystals. The objective of this experimental and theoretical research program is to investigate the plastic flow and fracture of body-centered-cubic bicrystals. Niobium and its alloys have been chosen for the study because they possess specific properties essential for extending the development of dislocation models, and because the methods of crystals growth and thin-foil preparation, and the work-hardening behavior of their single crystals are well understood. This investigation will help to characterize the deformation and fracture of bicrystals, and should lead to a better understanding of the mechanical behavior of polycrystalline materials.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0048, FRACTURE MODES OF COMPOSITE SYSTEMS
G.C. SIH, Lehigh University, School of Engineering, *Bethlehem, Pennsylvania* 18015 (AF-AFOSR-2586-74)

Composites are being used increasingly for aircraft structural and propulsion applications because of their superior property-to-weight characteristics. However, the classical techniques of fracture mechanics are inadequate for describing crack propagation behavior in composite materials and this has impeded progress in the basic understanding of failure modes in composites. A new theory, based on an 'energy-density factor' can model, analytically, realistic failure modes such as occur in fibrous and laminate composites. This theory will be applied first to uniaxial fibrous composites, for which the problems of transverse matrix cracking, crack bridging, fiber splitting, fiber pull-out and debonding, off-axis loading in tension and compression will be considered. Then, the theory will be extended and applied to laminates (stacked and bonded layers of the uniaxial fibrous material). The strength of laminates with part-through and through cracks in one or more layers will be determined. A criterion of failure will also be found for delamination of the layers under both tensile and compressive loads.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0049, FABRICATION OF NEW NITROGEN CONTAINING CERAMICS
M.J. NOONE, General Electric Company, *Philadelphia, Pennsylvania* 19101 (F33615-74-C-4073)

AF function - high temperature materials, advanced propulsion systems. Deficiency - lack of suitable materials needed to increase operating temperature and efficiency of propulsion and power generation systems, with potential cost and weight savings. Research - powder preparation methods, specimen fabrication techniques, and material properties will be determined for ceramics in the Si-Al-O-N and related systems. How research contributes - this research will determine if high temperature materials with superior properties can be obtained from the Si-Al-O-N and related systems. Such materials can lead to higher temperature operation, increased efficiency, reduction in size, increased lifetimes, and lower cost of propulsion and power generation systems.

Several fabrication methods are used to obtain dense specimens which are then used for room temperature and elevated strength determination. The relationship between fabrication technique, strength, and microstructure is then determined.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0050, THEORY OF BOND STRENGTHS IN METALS
L.A. GIRIFALCO, Univ. of Pennsylvania, School of Engineering, *Philadelphia, Pennsylvania* 19104 (AF-AFOSR-2325-72)

Current and future needs of the Air Force depend upon signigicant advances in structural materials. The synthesis of new and improved metals as well as the fundamental understanding of the behavior and performance of such metals are essential to superior operation in the aerospace environment. Advances in metallurgy require an understanding, from first principles, of the factors that control alloying, ordering, defect formation, diffusion, and chemical reactivity. These factors include crystal binding energy, the equilibrium lattice spacing, the equation of state, the elastic constants and the relative stability of different structures with the same composition. In metals, the theory of cohesion is ordinarily based on solutions of the wave equation which results in a reciprocal space theory. The primary objective of this research is to develop a quantum-mechanical theory of the bond strengths of metals in which metallurgical properties can be related to the energetics associated with atomic positions in real space. Specific goals are to obtain equations and numerical calculations for the bond strengths as a function of interatomic separation, to obtain the structure dependent terms in the bond strengths and compute relative energies of different structures, and to investigate the use of bond strengths in imperfect crystals with special attention to the impurity problem. An atomistic real space theory of metal energetics should provide a basis for understanding the fundamental mechanisms of crack initiation, fatigue and fracture.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0051, PROPERTIES AND REACTIONS OF ATOMIC SPECIES GENERATED AT HIGH TEMPERATURES
P.S. SKELL, Penn. State University, School of Liberal Arts, *University Park, Pennsylvania* 16802 (AF-AFOSR-1983-71)

New coating materials, lubricants, seals, and sealants which can withstand extremes in atmospheric conditions are needed by the Air Force for use in aerospace vehicles. Methods developed for generating novel reactive intermediates have potential in a variety of applications, particularly in the synthesis of aerospace materials which are capable of withstanding exposure to extremes in temperature, pressure, and high energy radiation. The research involves a study of the chemical and physical properties of elements in their elemental ground and excited states and their reactions with organic molecules. The original study of properties and reactivity of carbon vapors has been expanded to include atomic species of several metallic vapors, including silicon, nickel, boron, magnesium, platinum, aluminum, cobalt, tungsten and chromium. The techniques employed in generating these high temperature moieties involve electron bombardment, thermal vaporization, and electric arc vaporization methods. These active substances are trapped in a low temperature matrix where they become available for studies of their properties and their reactivity with organic molecules.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0052, THE EFFECT OF GRAIN SIZE ON THERMAL DIFFUSION IN METALS
J.P. STARK, Univ. of Texas, School of Engineering, *Austin, Texas* 78712 (AF-AFOSR-2343-72)

The application of materials to critical components of Air Force systems often demands that the mechanical and physical properties be stable, and that heterogeneity and segregation be minimized during processing, fabrication, and lifetime of the part. One significant problem area is related to exposure to high temperature. At high temperatures, the stability of mechanical and physical properties, as well as homogeneity of material composition, can be significantly altered. In metals, the redistribution of solutes can be a particularly acute problem when a temperature gradient is the driving force for segregation. However, very little is known about the effect of metallurgical structure on the amount of segregation in a temperature gradient. This research is concerned with an experimental evaluation of the effect of one such structural variable, namely, the effect of grain size and grain boundaries upon the driving force for thermal diffusion is to be examined. Concurrent measurements with varying solute concentrations will clarify the nature of the kinetic factors responsible for this segregation. Such an understanding is relevant to the engineering evaluation of any alloy to be used in a temperature gradient. In particular, this research relates to many problems that arise during long term service of structural and engine components at elevated temperatures.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0053, TIME-DEPENDENT FRACTURE OF PARTICULATE COMPOSITE MATERIAL
R.A. SCHAPERY, Texas A & M University System, School of Engineering, *College Station, Texas* 77843 (AF-AFOSR-2697-74)

Air Force solid propulsion systems are in need of improved service life prediction capabilities. A unified fracture theory for composite viscoelastic materials is needed which encompasses prediction of both fracture initiation and propagation. Results from this research project will improve the state of knowledge related to reliability, durability and performance of solid rockets required for Air Force missiles. This research project will extend the previously developed linear theory into the nonlinear material behavior region. In particular, the effects of finite strain fields at crack tips will be studied. Experiments will be conducted on uniaxial specimens to provide verification for the theoretical model. Principal experimental data will be sought which establishes the relations between instantaneous crack velocity and loading-temperature environment.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0054, LOW COST CAST PANELS FOR MILITARY VEHICLES

B. HANSON, L T V Aerospace Corporation, *Dallas, Texas* 75222 (F33615-73-C-3102)

Complex designs for advanced military flight vehicles that are difficult to fabricate result in high hardware cost and reduced reliability. Precision casting is one approach to the problem of producing lower cost structural component. New casting alloys have shown properties equal to those of wrought materials and limited production indicates a substantial cost savings. The objective of this program is to demonstrate the feasibility of casting low cost panels for flight hardware.

Precision casting offers a potential low cost method of producing structural panels. Aluminum casting alloy Ko-1 (201) and cast Ti-6Al-4V show mechanical properties comparable with wrought materials. During phase 1 a damage resistance panel configuration will be developed and the most economical production method determined. Mechanical properties, surface finish, defects, tolerances, and cost will be determined for the selected configuration. Under phase 2, the selected configuration(s) will be optimized and a comprehensive evaluation of the damage resistance made.

Supporting agency address information: AF Flight Dynamics Laboratory FBS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0055, THERMOCHEMISTRY OF HIGH TEMPERATURE MATERIALS

P. GROSS, Fulmer Research Institute, *Stoke Poges, England, United Kingdom* (F44620-72-C-0039)

The Air Force functions of communications and weapons delivery require new, improved materials which are subjected to high temperatures either in operation, such as nozzles, nose cones or combustors, or in fabrication, such as vapor deposition of coatings or in both. Determining methods of fabrication, evaluating candidate materials, or calculating lifetimes and performances of propulsion systems require reliable, accurate thermodynamic data. This research proposes to determine the heats of formation of several compounds which are important either as refractory materials or as probable degradation products. They include titanium trifluoride, silicon nitride and the higher fluorides and chlorides of tungsten and rhenium. The calorimetric methods include direct synthesis of the compounds in the calorimeter and combustion of compounds with a halogen.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0056, EFFECT OF FREQUENCY ON FATIGUE LIFE AND FAILURE MODE IN COMPOSITE MATERIALS

K. REIFSNIDER, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (AF-AFOSR-2358-72)

Composite materials can contribute to the design of light weight, reliable AF aerospace vehicles. This study provides understanding needed for design of composite structures for the avoidance of fractures due to flaws during cyclic loading. The effect of frequency of load oscillation on tensile fatigue life and mode of fatigue failure of flawed composite plate specimens will be determined both theoretically and experimentally. The grant's earlier work showed a very large, nonlinear frequency dependence which results in fracture mode transition that cannot be explained as a temperature effect in the classical manner. Further investigations will use time-resolved measurements of heat emission (video-thermography), dissipated energy (hysteresis loops) stress, strain, and acoustic emission to characterize and understand the micromechanisms which cause these effects. Then, mechanical models will be devised to predict these effects under general conditions. This theoretical effort will include an attempt to simulate damage using a unique three-dimensional finite element program by disconnecting nodes and using the changing stress field to try to predict the observed heat emission patterns. When the patterns match, the correct micromechanical process should have been reproduced. Special attention will also be given to fracture mechanics interpretations and other practical representations.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0057, REACTIONS AND ELECTROCHEMICAL KINETICS OF NEWLY GENERATED METAL SURFACES

T.R. BECK, Flow Research Incorporated, *Kent, Washington* 98031 (F44620-72-C-0070)

Air Force flight vehicles must withstand increasingly complex environmental and operational regimes. Fundamental knowledge of the mechanism of fatigue and fracture of flight structures is required. This research is directed to obtain knowledge of electrochemical mechanisms that operate in fatigue cracks and stress corrosion in flight structures. It includes the determination of kinetic parameters for newly-generated surfaces of titanium, aluminum and other metals that can be put into a quantitative mass transport-kinetic model to completely describe the electrochemistry in cracks. A new experimental technique employing corroding metal specimens of restricted geometry with the application of step potentials and transient current measurements will be used to yield information on conductivity, thickness, and kinetics of salt films. Other transition metals will be studied using these techniques. Models will be developed for nucleation and growth of salt, oxide films, and dissolution. The electrochemical mass-transport-kinetic model for stress corrosion of titanium using new kinetic data will be reformulated.

Supporting agency address information: AF Office of Scientific Research NC, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

3.0058, FINITE ELEMENT ANALYSIS OF ELASTIC-PLASTIC THREE DIMENSIONAL CRACKS

A.S. KOBAYASHI, Univ. of Washington, School of Engineering, *Seattle, Washington* 98105 (AF-AFOSR-2478-73)

Advanced high performance Air Force flight vehicles require the utilization of high strength to weight ratio structural metals. In order to achieve design objectives with these materials, problems in fracture and fatigue damage have repeatedly been encountered in state-of-the-art design and fabrication technologies. Methods of analysis which are focused on the study the stress intensity factors and crack propagation adjacent to material flaws provide one source of knowledge in the understanding and alleviation of fracture phenomena. This activity will develop finite-element idealizations of stress singularities at crack tips using the hybrid model approach. Elements will be developed from both the stress and displacement models. In addition the hybrid displacement model will incorporate the elastic-plastic material response at the crack tip.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, DEVELOPMENT OF AUTOMATED TEST PROCEDURES AND TECHNIQUES FOR LSI CIRCUITS
B.D. CARROLL, Auburn U iversity, School of Engineering, *Auburn, Alabama* 36830 (NAS 8-31190)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0002, APPROXIMATION METHODS FOR THE NONLINEAR MECHANICS OF SOLIDS AND STRUCTURES
T.J. CHUNG, Univ. of Alabama, Research Institute, *Huntsville, Alabama* 35807 (F44620-69-C-0124)

Advanced high performance flight vehicles are needed to fulfill such AF functions as weapon delivery and reconnaissance. Since structural weight directly affects performance, structural analysis methods for design of substantially more efficient flight structures are required. These, in turn, require a better understanding of nonlinear phenomena. This study is on nonlinear structural behavior, developing numerical methods for its analysis, and designing computer programs for use of these improved methods by the structural designer. A significant class of nonlinear structural problems which arise due to geometrical or material nonlinearities will be investigated. The investigation will be done by simultaneously calling upon theoretical and numerical techniques as well as existing experimental methods. A theory applicable to high intensity blast and thermal loads will be developed for nonlinear viscoelastic materials. All this will be performed so that meaningful nonlinear analysis can be carried out by the structural engineer.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0003, ALASKA ATS-F HEALTH/EDUCATION TELECOMMUNICATIONS EXPERIMENT
C. NORTHRIP, State Off. of Telecomm., *Juneau, Alaska* 99801 (OEG-0-73-28960)

The ATS-F will provide the first opportunity for the utilization of satellite communications for the transmission of television and multiple voice channels to low-cost earth stations. Four broad content areas have been selected in which to develop courseware to be broadcast over the satellite; (1) Instructional Programming, (2) Health Education, (3) Alaska Native Magazine, and (4) Public Broadcasting Service. The programming beamed to Alaska via ATS-F will be multifaceted, ranging from formal academic instruction to information on health education and topics particularly interesting to Alaskan natives. The Instructional Programing area will stress courseware development with consumer input as an integral part of the process, in such areas as Early Childhood Development, Basic English Oral Communication for Youngsters, and In- Service Teacher Training. Health Education will stress improvement of health habits, with approximately two half-hour video sessions augmented with additional audio consultation with a health-education specialist. Alaska Native Magazine is to be aimed at developing cultural pride; and the Public Broadcasting Service portion of the experiment will feed satellite transmissions for contrasting public response to live versus delayed broadcasting. (Author)

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.E.

4.0004, A WORKSHOP TO ASSESS THE IMPACT OF RECENT TELECOMMUNICATIONS ADVANCES ON THE DEVELOPMENT OF EDUCATIONAL TELEVISION
B.B. LUSIGNAN, Stanford University, Schoo! of Engineering, *Palo Alto, California* 94305 (NIE-C-74-01200)

This proposal is to allow Stanford University to conduct a one-week workshop to assess the impact of recent telecommunications advances on the development of educational television (ETV). Participants in the workshop would include the staff of the Educational Technology Center of NIE, Stanford staff and consultants, and individuals representative of the different institutions that can be expected to be a part of ETV in the near future. The purpose of the workshop is to review the technological and economic changes and to discuss different actions that government and non-government institutions could take to foster the efficient development of educational television. The workshop would be limited to between fifteen and twenty people. Participants would be expected to actively contribute to the discussions and would be selected to represent the breadth of relevant background. The Stanford staff and consultants would work with the NIE staff in selection of participants, would develop information with the participants prior to the workshop, would coordinate the workshop itself, and would prepare a written report on the outcome of the discussions. If there is an informal agreement that funds would be available by mid March, the seminar can be held in late March '74. Due to the nature of the subject it should be held no later than June '74. The seminar would preferably be held in two 2 day sessions, but if necessary it could be held for five consecutive days. It is suggested that two weekends be scheduled for the split meeting, or, if it is five consecutive days, that a weekend be included to facilitate participation of key people. (Author)

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.E.

4.0005, ANALYSIS OF ULTRASONIC WAVE SCATTERING FOR CHARACTERIZATION OF DEFECTS IN SOLIDS
E.R. COHEN, Rockwell International Corp., *Thousand Oaks, California* 91360 (F44620-74-C-0057)

The AF needs assured reliability of the structural components of its aerospace vehicles for the performance of its missions. Ultrasonic inspection has become an important tool for the detection of possible cracks or other anomalies in metals, but its utility in insuring reliability would be greatly enhanced if it could provide information concerning the size, composition and shape of the anomaly. The objective here is to perform the necessary mathematical analysis of ultrasonic wave scattering so that the rapid data acquisition, storage and computational abilities of the computer can be used effectively for characterizing defects within solids. First, an analysis of the scattering of ultrasonic waves from am embedded ellipsoid of revolution in an isotropic medium will be performed to determine the amplitude, the phase, the scattering angle and the mode type (shear or longitudinal) of the scattered waves. Then the nature of the scattering from the grain boundaries which possess elastic anisotropy will be analyzed to determine how seriously the grain structure of a polycrystalline medium affects the scattered energy. Finally, ultrasonic tests on special specimens containing well defined inhomogeneities will be carried out to verify the theoretical predictions and to delineate areas of possible experimental difficulties.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0006, TURBULENCE MODEL TRANSITION PREDICTIONS FOR BLUNT-BODY FLOWS
D.C. WILCOX, D C W Industries, *Van Nuys, California* (F44620-74-C-0048)

Blunt reentry heat shields sometimes experience unprogrammed ablative shape changes on account of unpredicted boundary layer transition. In severe cases the resulting aerodynamic disturbances cause a malfunction of the spacecraft. This effort will apply the Saffman Formulation of a turbulence model based on Reynolds Equations with assumed closure conditions to the prediction of transition on blunt shapes, taking account of roughness, wall cooling, and variable body shape. A number of numerical calculations will be made for simpler problems first in order to make needed refinements to the model. The eventual object of the research is to produce a computer algorithm suitable for heat shield aerodynamic design purposes.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0007, QUANTUM ELECTRONIC FREQUENCY STANDARDS
D.J. GLAZE, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Boulder*, *Colorado* 80302

Both primary frequency standards, NBS-4 and NBS-5 were used in calibrations of the atomic time scale. The frequency of the International Atomic Time (TAI) was found 10 x 10 to the minus thirteenth power too high. The definition of the second was realized with 1.3 x 10 to the minus thirteenth power one-sigma uncertainty. Stabilities of 9 x 10 to the minus fifteenth power were realized with NBS-4 and NBS-5, better than any other existing cesium device. A methane beam system became operational. H-storage was studied and accuracy limiting effects identified. Crystal resonator noise was found to be low enough to offer the possibility of designing crystal oscillators with 1 x 10 to the minus twelfth power stability for 1 ms. Commercial Rb standards demonstrated their potential to be used as precise portable clocks. An automated electronics system was completed and used to acquire velocity distribution information (essential for accuracy evaluations) on NBS-4 and several commercial cesium tubes.

Objective: To generate and maintain the unit of time by establishing an operational primary frequency standards system. To improve the unit of time by developing a concept for the next generation NBS primary frequency standard based on research on existing and new frequency standards. To develop an operational measurement service based on internal hardware capability as well as on dissemination of frequency metrology knowhow. To contribute to the national and international effort in the field.

Motivation: The NBS responsibility to generate, maintain and improve the unit of time interval is delegated to the T&F Division. The accurate realization of the Second has to be made accessible to users by (1) calibrating the Atomic Scale and the associated time dissemination services, (2) offering measurement services, (3) developing techniques and devices which allow the interested user to acquire his own measurement capability. This last item (3) is important in a highly technological society where accuracy is often an operational systems need which cannot be met by 'traditional' calibrations at the location of the base standard. The performance of the reference base standard must either be available through communication links between the user and NBS or through information, technical assistance and/or prototype development which enables the user to have his own reference standard. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

4.0008, SATELLITE TIME SERVICE DEVELOPMENT
D.W. HANSON, U.S. Dept. of Commerce, Natl. Bureau of Standards, *Boulder*, *Colorado* 80302

This project is a long-range development to specify and implement a time and frequency broadcast service from geostationary satellites. This must meet the increasing demands for higher accuracy, greater coverage, and increased signal reliability at minimum cost to the government and the user. The project may ultimately lead to the system of dissemination which will replace the Bureau's services on WWV and WWVH.

Objective: To meet the need for a widely available, low cost, satellite time & frequency broadcast service. This is to be accomplished on the internationally allocated frequency of 400.1 MHz.

Motivation: Although present time/frequency services meet some needs, many are not met. Satellites are the best bet to complement radio services. With satellites, coverage, accuracy and signal reliability are dramatically better. The cost to the user and government will be much lower. Recent NBS satellite experiments received 9,000 inquiries.

Approach: Conduct NBS satellite experiments with NOAA and NASA. Use the NOAA GOES satellite for timing experiments to test codes and equipment. Work actively on the new Disaster Warning Satellite planning committees to get timing services included. Brief those committees and other agencies on our requirements and learn of their programs. Establish a formal channel of communication to other agencies through a central (lead) agency such as NASA. Publicize results of our experiments to obtain user feedback.

Progress: Completed WWV type broadcast from ATS-3. Confirmed increased accuracy (three orders of magnitude), high signal levels, wide coverage (no fading), low cost and less labor involvement compared to high frequency radio systems. Began the GOES program. Satellite launched and successful. Installed equipment at Wallops Island. Designed and built prototype decoders. Briefed NOAA's Disaster Warning Satellite Committee on NBS satellite service requirements.

Plans: Broadcast time code from GOES satellite (October '74). Include satellite position in GOES broadcast (March '75). Automate GOES broadcast and certification (July '75). Begin trilateration development for high accuracy time transfer through GOES (April '75). Go on notice to all agencies through a lead or coordinating agency concerning NBS. (Text Abridged)

SUPPORTED BY U.S. Dept. of Commerce - N.B.S.

4.0009, SURFACE CRACKS AT FASTENER HOLES
F.W. SMITH, Colorado State University, School of Engineering, *Fort Collins*, *Colorado* 80521 (F33615-74-C-3069)

Cracks occurring at fastener holes in primary structure can degrade strength and safety of flight for aerospace vehicles. The knowledge of growth behavior and methods to predict strength of structures containing cracks is required to saftisfy USAF damage tolerance requirements. The objective of this effort is to obtain analytical solutions for a class of three-dimensional problems associated with surface and embedded cracks emanating from fastener holes.

Numerical methods will be used to obtain stress intensity factor solutions. The solutions will be experimentally verified using epoxy models.

Supporting agency address information: AF Flight Dynamics Laboratory FBE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0010, TECHNOLOGY RESEARCH FOR STRAPDOWN INERTIAL EXPERIMENT
R.B. JENKINS, Southern Colo. State College, Undergraduate School, *Pueblo*, *Colorado* 81004 (NSG 2048)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0011, APPALACHIAN ATS-F SATELLITE EDUCATIONAL TECHNOLOGY DEMONSTRATION
H.E. MORSE, Appalachian Reg. Commission, *Washington*, *District of Columbia* 20009 (OEG-0-72-49210)

This project is one component of a three-part effort which will utilize NASA's ATS-F satellite in an educational delivery system. The experiment is viewed as a means of strengthening local in-service education programs in Elementary Reading and Career Education. The demonstration is being developed for teachers to participate through 15 Regional Education Service Agencies (RESAs) located throughout Appalachia. Video and computerized in-service course material is slated for development and distribution by a Resource Coordinating Center (RCC) located at the University of Kentucky in Lexington, Kentucky. A major objective of the Appalachian ATS-F Experiment is to demonstrate the feasibility of large-scale resource development over diverse geographical and demographic areas using a variety of communications distributions systems. The proposed delivery system will utilize both the video and audio capabilities of ATS-F and the audio-digital capability of ATS-3 to link 15 RESAs to the RCC. (Author)

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.E.

4.0012, ANTENNA AND WAVE PROPAGATION APPLIED TO AVIONICS SYSTEMS
H. LIEBOWITZ, George Washington University, School of Engineering, *Washington*, *District of Columbia* 20037 (NSG 1110)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0013, ANALYSIS AND ASSESSMENT OF THE EDUCATION SATELLITE COMMUNICATIONS DEMONSTRATION
POSNER, Practical Concepts Inc., *Washington, District of Columbia* 20036 (NIE-C-74-00470)

The National Institute of Education has awarded grants to the Federation of Rocky Mountain States, Inc., the Appalachian Regional Commission, and the State of Alaska's Office of Telecommunications, enabling each to participate in a satellite education television demonstration program. These organizations will conduct and manage the operational aspects of the satellite demonstration program. These organizations will also gather and analyze operational data about their own components of this demonstration. The demonstration program is expected to begin about May 1974 and continue for approximately one year. The Contractor shall provide all necessary qualified personnel, facilities, materials and services (including travel and subsistence) required to produce a useable design, for the assessment and analysis of the Educational Satellite Communications Demonstration. (Author)

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.E.

4.0014, ACOUSTIC PROPERTIES OF TURBOFAN INLETS
B.T. ZINN, Georgia Inst. of Technology, School of Aerospace Engin., *Atlanta, Georgia* 30332 (NSG 3036)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0015, ACOUSTIC PROPERTIES OF TURBOFAN INLETS
B.T. ZINN, Georgia Inst. of Technology, School of Mechanical Engin., *Atlanta, Georgia* 30332 (NSG 3036)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0016, ELECTROMAGNETIC SCATTERING AND DIFFRACTION PROBLEMS FOR PERFECTLY CONDUCTING OBJECTS
P.L. USLENGHI, Univ. of Illinois, School of Engineering, *Chicago, Illinois* 60680 (AF-AFOSR-2263-72)

It is important to resolve the current problems of electromagnetic transmission, reception, environment and reflection, associated with aerospace vehicles and equipment. Specific concerns include the development of techniques to decrease the electromagnetic effect introduced by an object, to reduce the radar reflectivity and emmissivity of the object, to enhance vehicle detection, and to improve the efficiency and design of aerospace radomes and antennas. In particular, this includes the development of new mathematical methods to characterize the electromagnetic effects caused by the shape of an object. This is the principal goal of this research program. New extensions and applications of the geometrical theory of diffraction to the scattering of electromagnetic waves by perfect conductors and inhomogeneous dielectrics are being investigated. Specific shapes considered include objects having surface elements parallel to the direction of plane wave incidence, in particular the right circular cylinder of finite length viewed at or near axial incidence, and the circular disk at grazing incidence. These investigations employ the theory of turning points for second order differential equations. The program is being conducted jointly with Professor T. B. A. Senior of the University of Michigan.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0017, FINITE ELEMENTS FOR FLUIDYNAMICS
N. GEFFEN, Tel Aviv University, *Tel Aviv, Israel* (AF-AFOSR-2561-73)

Both present and future af aerospace vehicles will be required to fly at high speeds and have an ability to maneuver at all speeds. This will require that new and improved engineering design and analysis methods be developed throughout the total speed regime for the precise engineering determination of the performance and system capabilities of these vehicles. This research will attempt to develop new methods for fluid dynamical analysis using high speed computers, methods which circumvent the disadvantages of currently employed machine algorithms. In particular, this research will investigate the possibility and feasibility of using finite-element analysis and procedures for the solution of quasi-linear hyperbolic and mixed initial value problems, with application to unsteady flow about bodies, time-dependent simulation of aerodynamic phenomena in all speed ranges, steady transonic flows (including the case of the super-critical wing) and to internal gasdynamic flows (e.g. cascades and inlets).

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0018, LIMB VOLUME MEASURING SYSTEM STUDY
J.F. LAFFERTY, Univ. of Kentucky, School of Engineering, *Lexington, Kentucky* 40506 (NAS 9-14392)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0019, CONTROL FOR LARGE SCALE AND UNCERTAIN SYSTEMS
M. ATHANS, Mass. Inst. of Technology, School of Engineering, *Cambridge, Massachusetts* 02139 (AF-AFOSR-2273-72)

In carrying out its mission in such diverse areas as space vehicle attitude control, radar tracking, boost vehicle guidance, and trajectory and impact point prediction, the Air Force encounters a significant problem which is common to each of the involved systems. Unpredictable inputs, such as gusts on aircraft, produce undesirable system performance deviations, and these deviations must be corrected based upon measurements obtained from noisy sensors. This proposal is directed toward the understanding of the interrelations present in alternate ways of handling uncertainties in the analysis and design of systems, with special emphasis on the application of these techniques to nonlinear filtering, adaptive control, differential games, and large scale systems. Inherent problem structure would be used in studying highly structural nonlinear estimation and control problems, such as those encountered with bilinear systems where the noise and control processes multiply the state. Performance standards will be sought to compare and evaluate suboptimal nonlinear filters. Proper methods for utilizing sensor information in centralized and decentralized control modes will be sought. A better framework will be established to provide approximate solutions with information interfaces for large engineering systems where information decentralization is necessary.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0020, THE DEVELOPMENT OF THE ELECTROSLAG WELDING-CASTING PROCESS FOR PRODUCING A COOLED RADIAL TURBINE
D.C. BUFFUM, U.S. Army, Materials & Mechanics Res. Ct., *Watertown, Massachusetts* 02172

The objective of this program is to develop the electroslag welding-casting process for the fabrication of smell, cooled, radial turbine rotors.

Using cast rotor blades or cast simulated rotor blade platforms, a turbine will be constructed by welding the platforms together and fabricating a core and joining it to the platforms. This operation will be done using the electroslag weld-casting technique. The joining and core fabrication will be done in one simultaneous operation.

Supporting agency address information: AMC Materials and Mechanics Research Center, Watertown, Ms. 02172

SUPPORTED BY U.S. Dept. of Defense - Army

4.0021, THERMAL NEUTRON RADIATION EFFECTS IN II-VI COMPOUNDS

C. KIKUCHI, Univ. of Michigan, School of Engineering, *Ann Arbor, Michigan* 48106 (F33615-72-C-1189)

AF function - electronic systems survivability, airborne communications, detection systems. Deficiency - electronic materials not sufficiently resistant to radiation damage, defects in materials change material properties in unknown manner. Research - thermal neutron radiation damage study of semiconduction materials. How research contributes - identifies defects in semiconductors and changes in physical properties of these materials as a function of radiation damage. Measurements of optical and electrical properties of materials are made before and after irradiation at temperatures between cryogenic temperatures and room temperature. EPR measurements are made to determine physical nature of radiation induced defects. Understanding the nature of damage and energy level structure of materials allows definition of hardening techniques and new potential application.

After thermal neutron irradiation to different doses (integrated fluxes electrical and galvanomagnetic measurements are performed to initially access the damage suffered by the material depletion in carrier concentration, introduction of scattering centers, etc.). To specifically identify the nature and lattice position of the defect electron spin resonance techniques are used, the measurements being performed in the temperature range from 4.2 degree K to 300 degree K.

Supporting agency address information: Aerospace Research Laboratory LS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0022, ELECTROMAGNETIC SCATTERING AND DIFFRACTION PROBLEMS FOR PERFECTLY CONDUCTING OBJECTS

T.B. SENIOR, Univ. of Michigan, School of Engineering, *Ann Arbor, Michigan* 48106 (AF-AFOSR-2262-72)

It is important to resolve the current problems of electromagnetic transmission, reception, environment and reflection, associated with aerospace vehicles and equipment. Specific concerns include the development of techniques to decrease the electromagnetic effect introduced by an object, to reduce the radar reflectivity and emmissivity of the object, to enhance vehicle detection, and to improve the efficiency and design of aerospace radomes and antennas. In particular this includes the development of new mathematical methods to characterize the electromagnetic effects caused by the shape of an object. This is the principal goal of this research program. New extensions and applications of the geometrical theory of diffraction to the scattering of electromagnetic waves by perfect conductors and inhomogeneous dielectrics are being investigated. Specific shapes considered include objects having surface elements parallel to the direction of plane wave incidence, at or near axial incidence and the circular disk at grazing incidence. These investigations employ the theory of turning points for second order differential equations. The program is being conducted jointly with Professor P. L. E. Uslenghi of the University of Illinois at Chicago Circle.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0023, BEHAVIOR OF FINE-GRAINED SOILS UNDER HIGH-SPEED TIRE LOADS

C.J. NUTTALL, U.S. Army, Waterways Experiment Station, *Vicksburg, Mississippi* 39180

The objective of this program is to obtain a useful description of the sinkage, load, and drag performance of pneumatic tires operating at speeds up to 100 mi/hr in relatively low-strength, fine-grained soil. An accurate, quantitative description of tire-soil interaction for a wide range of tire speeds will be particularly useful in the design of running gear for aircraft that must operte sometimes from earthen airstrips, and in the prediction of the high-speed ground performance of such aircraft.

The basic approach will be to alter the dimensionless relations of dependent tire performance versus independent tire-soil numeric that have been developed by WES for the low-speed situtions to account for the effects of high speed on tire-soil performance. The nature of the alteration needed will be determined by analyzing data from several high-speed field tests of a four-wheel-drive vehicle conducted by WES and data from high-speed tests conucted by other agencies (with the permission of each agency for the use of its data).

Supporting agency address information: OCE Waterways Experiment Station, P.O. Box 631, Vicksburg, Mi. 39180

SUPPORTED BY U.S. Dept. of Defense - Army

4.0024, ANALYSIS AND ASSESSMENT OF THE EDUCATION SATELLITE COMMUNICATIONS DEMONSTRATION

L. DEWITT, Syracuse University Res. Corp., *Syracuse, New York* 13210 (NIE-C-74-00460)

The National Institute of Education has awarded grants to the Federation of Rocky Mountain States, Inc., the Appalachian Regional Commission, and the State of Alaska's Office of Telecommunications, enabling each to participate in a satellite education television demonstration program. These organizations will conduct and manage the operational aspects of the satellite demonstration program. These organizations will also gather and analyze operational data about their own components of this demonstration. The demonstration program is expected to begin about May 1974 and continue for approximately one year. The Contractor shall provide all necessary qualified personnel, facilities, materials and services (including travel and subsistence) required to produce a useable design, for the assessment and analysis of the Educational Satellite Communications Demonstration.

SUPPORTED BY U.S. Dept. of Hlth. Ed. & Wel. - N.I.E.

4.0025, DESIGN OF A HYBRID MNOS/PLATED WIRE MEMORY SYSTEM

H. LOBENSTEIN, General Electric Company, *Utica, New York* 13502 (F33615-74-C-1096)

To determine the feasibility of combining MNOS EAROM storage and plated wire scratch pad storage into a single memory for re-entry applications. A further objective of this effort is to establish the radiation hardness levels for aluminum gate PMNOS devices on sapphire substrates, with the specific goal of improving the hardness of the MNOS memory array presently under development at AFML.

The contractor shall design a hybrid MNOS/plated wire memory having 3072 words of 24 bits each of MNOS EAROM program storage and 1024 words of 24 bits each of plated wire scratch pad storage. Logic design, circuit design, and mechanical design will be performed. The contractor will perform tradeoffs to assess the advantages and disadvantages of the hybrid memory compared with an equivalent memory that is all plated wire. The electrical performance and radiation response of aluminum gate PMNOS devices on sapphire substrates will be assessed to determine their applicability for a hybrid memory system. The read cycle time of the memory should be 1.5 microseconds or less, the read access time should be 0.5 microseconds or less, and the scratch pad write cycle time should be 1.5 microseconds or less. The MNOS write cycle time shall be one millisecond.

Supporting agency address information: AF Avionics Laboratory TEA, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0026, STUDY OF THREE DIMENSIONAL VISCOUS INTERACTIONS

R.T. DAVIS, Univ. of Cincinnati, School of Engineering, *Cincinnati, Ohio* 45221 (F33615-73-C-4014)

AF function - advanced aerospace vehicles. Deficiency - analytical methods on interacting flows are limited to predictions based on two- dimensional concepts. Research - develop a computer program and demonstrate successful correlation with experimental data of three- dimensional shock wave-boundary layer interactions. How research contributes - aerospace vehicles are developed empirically by means of wind tunnels since three-dimensional prediction methods are lacking. Analytical methods will be faster and less expensive to employ than wind tunnel testing thereby shortening the development cycle of new aerospace systems.

A numerical technique will be developed to compute three-dimensional interacting boundary layers, valid to second order. Initial applications will be directed toward flows which are 'weakly'three- dimensional so that concepts can be closely monitored. A shock wave impinging at incidence on a flat plate boundary layer shall then be computed and correlated with experimental data. The complete boundary layer over a delta wing configuration at incidence shall also be determined. These investigations will produce computer programs useful for design of aerospace systems.

Supporting agency address information: Aerospace Research Laboratory LH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0027, COMPOSITES FABRICATION FACILITY FOR AIR FORCE STRUCTURES

R.T. ACHARD, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

The use of composite-laminated-structures is necessary to meet many requirements of advanced USAF aircraft, including increased cost effectiveness and reduced maintenance. Strength and reliability of these structures are dependent on fabrication methods, accurate tests require innovative instrumentation concepts, and repair/modification of prototype hardware will effect research cost savings. Thus, the objective of this program is to design and implement an in-house facility to fabricate and instrument structural components from composite laminates. This will provide the AFFDL with an in-house basis for quick response prototype fabrication, instrumentation, and structural technology development, overall research costs will be reduced compared to alternate fabrication sources.

A 6 ft by 18 ft/800f/200 PSIG custom-built pressure-curing autoclave will be installed in a newly-constructed composite work area. Additional equipment for lamination and composite test will be obtained. The facility will be initially operated to determine acceptance of equipment and train operating personnel. At the completion of this work unit the AFFDL will have a posture for inexpensive fabrication and repair of airframe composite structures.

Supporting agency address information: AF Flight Dynamics Laboratory FBS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0028, ADAPTATION OF FATIGUE ANALYSIS METHODS (MODIFIED MINER'S RULE) TO ESTIMATE ALLOWABLE STRESS FOR ADVANCED AIRFRAME PRELIMINARY DEISGN

E.A. DAVIDSON, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Successful acquisition of future Air Force aircraft requires the development of innovative structural design concepts if constraints on cost and schedule are to be met. These designs must satisfy the reliability requirements of the aircraft structural integrity program defined in MIL-STD-1530. The development of advanced structural concepts which meet these requirements must establish the weight and cost impact of fatigue requirements early in the design cycle. The objective of this work effort is to acquire and adapt a fatigue analysis procedure applicable during preliminary design yet sensitve to design concept, materials application and manufacturing method.

The preliminary structural design fatigue methodology will be derived from current advances in fatigue analysis and modifications to methods used by industry. This involves modifying Miner's Rule to include load sequencing effects. Problems to be resolved include characterization of fatigue properties for new materials and estimation of stress concentration factors. Historical reliability data and current approaches will be examined to develop a rationale for simplifying decisions. The developed methodology will be incorporated into preliminary structural design computer programs.

Supporting agency address information: AF Flight Dynamics Laboratory FBR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0029, COMPARATIVE EVALUATION OF GENERAL PURPOSE STRUCTURAL ANALYSIS COMPUTER PROGRAMS USED FOR USAF STRUCTURAL ANALYSIS

R.M. ENGLE, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

With the increasing cost of testing of USAF aircraft, the need for efficient, computerized analysis of large scale structures is imperative. To provide a rational basis for development, a comparative evaluation of existing programs to determine desirable characteristics of a large scale general purpose structural analysis computer program will be made.

The approach to this evaluation will be to select a range of problems to serve for comparisons as to computer time, accuracy, interpretation of output, ease of input, etc. These problems will include typical system applications and should exercise all options of the programs being tested. Convergence studies will be made where fineness of idealization in terms of degrees of freedom can be varied and the results compared with exact solutions. The programs to be evaluated will include MAGIC, FORMAT, and NASTRAN.

Supporting agency address information: AF Flight Dynamics Laboratory FBR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0030, ADAPTATION OF EXTERNAL LOADS ESTIMATION METHODS FOR THE PRELIMINARY STRUCTURAL DESIGN OF AIRCRAFT WING AND TAIL SURFACES

A. GONSISKA, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Future military aircraft will require the development of innovative structural design concepts if all design objectives are to be achieved within specified constraints on cost and schedule. The objective of this work unit is to acquire, assess and adapt existing lifting surface external load estimation methods for use in conceptual design studies to identify the most promising structural design concept in terms of airframe cost, weight and reliability. Accomplishment of these studies requires the timely and accurate estimation of external loads.

The suitability of existing flight and ground load estimation methods will be determined through a literature review and consultation with the design criteria personnel of structures division. The criteria for determining the suitability of a procedure will be its speed and accuracy in determining loads as a function of lifting surface platform, velocity and angle of attack. The capability to evaluate the influence of external stores and fuselage interference effects will be considered. Methods for evaluating the magnitude of landing and taxi loads will also be investigated. The most promising techniques will be acquired and adapted to existing and planned structural sizing and cost estimation programs.

Supporting agency address information: AF Flight Dynamics Laboratory FBR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0031, NASTRAN COMPUTER PROGRAM

J.R. JOHNSON, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Structural stength, integrity, service life and minimum weight are vital concerns in the design and analysis of aerospace vehicles to insure that they perform the intended mission. The objective of this effort is to develop efficient general purpose finite element structural analytical methods that will directly support the design and analysis of structures for strategic, tactical, training and logistic aerospace vehicles. The successful accomplishment of this objective will insure the ready capability to provide the analysis support for aerospace systems, such as the B-1, CCV and RPV, with a minimum of elapsed time and, to provide a NASTRAN focal point for the WPAFB NASTRAN users group.

Coordinate the efforts of the users group. Provide consultation and direction as required to use, maintain and modify the computer program. Serve on the HQ NASA NASTRAN advisory group (NAG).

Supporting agency address information: AF Flight Dynamics Laboratory FBR, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0032, TURBULENT FLOW RESEARCH
J.H. LEE, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - advanced propulsion and flight systems design. Deficiency - inadequacy of present techniques for treating turbulent fluid motions. Need for new theoretical models and evaluation of existing theories in aero-acoustics for suppression of acoustic duct noise. Research - advance the understanding of turbulent flows and aero- acoustics, and implement this knowledge in AF engineering problems involving turbulence and aerodynamic noise. How research contributes - basic turbulence knowledge can be applied readily to a wide range of aircraft design problems. In support of RN-AFFDL-04-72-3, the aircraft response to atmospheric turbulent gusts has been examined with the purpose of incorporating nonstationary and non-gaussian turbulent flow. In support of RN-AFAPL-08-72-9, the development of improved mathematical models for describing sound transmission in soft wall ducts has been accomplished.

In problems involving fluid turbulence, random phenomena are treated with stochastic theories in statistical analysis/mechanics, direct numerical simulation, and stochastic modeling. For instance, the aircraft response work uses the statistical analysis coupled with stochastic modeling. The non-stationary turbulent gust is modeled by a series of stationary processes to investigate the response exceedance. Under RN-AFAPL-08-72-9, work has been extended to include the acoustic analysis of variable area ducts and constant area ducts with boundary layer effects.

Supporting agency address information: Aerospace Research Laboratory LB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0033, RESEARCH FACILITY UTILIZATION AND INSTRUMENTATION
D.H. MURRAY, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - advanced aerospace vehicles (hypersonic flight). Deficiency - environmental influences affecting vehicle flight characteristics of hypersonic velocities are not fully understood. Research - develop ground-based test facilities to simulate flight conditions, develop instrumentation to determine flow parameters. How research contributes - will provide the research tools for tests of basic aerodynamic shapes for the attainment of research data which is required by aerospace engineers for the design and development of advanced prototype flight vehicles. The objective is advancement of diagnostic methods pertaining to experimental research in fluid dynamics and acquisition of data in hypersonic wind tunnels and other gas flow test facilities

The specific research effort on three-dimensional diagnostic techniques is directed toward the development of instrumentation devices for measuring point properties of complex flow fields without disturbing the flow field. New measurement and recording techniques will be investigated as developed. Current test programs being supported include those involving supersonic combustion, dynamic stability of cones, laser velocimetry, delta-wing similitude, cone nose tip geometry effects, flat plate-wedge corner flow, and the SAMSO ACE configuration, all in the hypersonic flow regime. In addition, tests will be conducted on nozzle throat effects. Effects of suspended solid particles on gas flow boundary layers are being investigated and directed toward the determination of the effects that suspended solid particles have on the properties of boundary layers created by gas flowing adjacent to solid walls.

Supporting agency address information: Aerospace Research Laboratory LF, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0034, COMPUTATIONAL FLUID MECHANICS
J.S. PETTY, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - special aerodynamic problems, shock wave-boundary layer interaction, transonic flow fields, high power lasers. Deficiency - incomplete knowledge of complex two- and three-dimensional flow field structure. Research - development of numerical methods for the solution of the complete fluid flow equations (Navier-Stokes) and application to a variety of gasdynamic problems of interest to the AF. How research contributes - efficient and accurate numerical methods of solving gasdynamic problems are becoming increasingly useful tools for the investigation of complex flow situations. Problems of AF interest to which this research will be directly applied are shock wave-boundary layer interactions, flow separation at transonic speeds, gasdynamic problems related to high power lasers and some inlet design problems. Further in the future, numerical solutions of flows about configurations can be expected to replace much of the wind tunnel testing now necessary in the design cycle.

Generalized computer codes are being developed to calculate relatively complex two-dimensional unsteady flows with laminar and turbulent boundary layers.

Supporting agency address information: Aerospace Research Laboratory LH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0035, EFFECT OF LOAD SEQUENCE ON THE FATIGUE ANALYSIS OF USAF AIRFRAME STRUCTURES
J.M. POTTER, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

Residual stresses are responsible for structural life increase or reduction from simple changes in load spectra. Recent in-house studies and experiments have proven that residual stress levels in aircraft structures can change significantly during both constant amplitude and flight spectrum loading. The objective of this program is to measure and document the changing residual stress levels and to characterize, in general, their behavior. The result is expected to be a much improved analytical means of airframe fatigue life prediction for design, evaluation, and testing of USAF airframe structural systems.

Residual stresses in notched structures subjected to spectrum loading will be periodically measured by x-ray diffraction techniques. The residual stress level introduced by an overload will be monitored extensively for a large number of smaller amplitude cycles to obtain an empirical evaluation of the cycle-dependent residual stress behavior. The cycle-dependent behavior will then be incorporated into a fatigue analysis for aircraft structures that are subjected to a spectrum of loading.

Supporting agency address information: AF Flight Dynamics Laboratory FBE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0036, AIRCRAFT GROUND LOADS DESIGN CRITERIA
D.M. SHEETS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

This effort responds to ASD TN's 36-72-519 'Strength and Fatigue Design Requirements For Aircraft Operations On Airfields' and 36-72-520, 'Design Limit Sink Speed' which identify current deficiencies in aircraft design requirements. The objective of this work is to develop aircraft ground loads criteria for landing impact, take-off, turning, braking, towing, jacking and pivoting when operating from prepared, semi-prepared and unprepared airfields. These design criteria will be for the strength and fatigue life requirements of the aircraft. In addition, computer programs are to be generated for application of these criteria to present and future systems. The results of this program will improve the reliability of aircraft and reduce structural maintenance.

Current specification requirements in the above requirement areas will be reviewed and discussions with airframe contractors will be conducted to determine what requirements are considered inadequate. Visits will be made to contractor's facilities to obtain aircraft characteristics and operational ground loads data, where available, to provide the necessary rational for changes in requirements. Structural strength and analysis prediction methods will be developed for evaluating future aircraft systems as well as modifications to existing systems. The results of this work effort will be used for revising MIL- A-8862 and MIL-A-8866 specifications.

Supporting agency address information: AF Flight Dynamics Laboratory FYS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0037, STRUCTURE FATIGUE CHARACTERIZATION (STRUCTURE SPECIMENS)
D. SIMPKINS, U.S. Air Force, Flight Dynamics Lab., *Dayton, Ohio* 45433

In-service structure fatigue failures occur that impact the operational readiness of USAF aircraft. The objective of this effort is to develop an improved empirical fatigue damage model. An improved model will contribute to the reduction of in-service fatigue problems.

Flight loads data shall be used to establish representative aircraft loadings. These data along with mission USAGE information shall be input data to a computer program to numerically generate simulated flight loading sequences. These sequences shall be applied to structure specimens in an experimental phase. The test results and the intensity of the simulated flight loadings shall be used to establish a test integrated damage model.

Supporting agency address information: AF Flight Dynamics Laboratory FBE. Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0038, TWO-SITE RADAR/OPTICAL OBSERVING PROGRAM
R.C. VANDERBURGH, U.S. Air Force, Avionics Laboratory, *Dayton, Ohio* 45433

To collect simultaneous spacecraft signatures (unresolved), at both optical and radar wavelengths, at two sites, to reduce and analyze the data, and to report the informational enhancement gained by these simultaneous efforts, over that information which could be obtained by similar, but non-simultaneous observation.

To observe selected targets of interest simultaneously by the Calspan S-band radar and the AFAL OPOS 24-inch photoelectric system, with Calspan to reduce and analyze all the collected data, and to report results. As a jointly sponsored effort by the foreign technology division (FTD) and the AFAL, the AFAL worked directly w/Calspan to collect the required radar optical data. FTD has the responsibility to monitor Calspan's data reduction and other contractual obligations. Overall assessment of Calspan's results will be jointly undertaken by FTD and AFAL.

Supporting agency address information: AF Avionics Laboratory RSO, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0039, AERODYNAMIC STABILITY PROBLEMS AT HYPERSONIC SPEEDS
O. WALCHNER, U.S. Air Force, Aerospace Research Labs., *Dayton, Ohio*

AF function - reentry vehicles. Deficiency - lack of knowledge of pertinent aerodynamic coefficients entering the equations of motion. Research - to explore static and dynamic stability derivatives for configurations with linear and nonlinear static moments. How research contributes - knowledge is provided of important aerodynamic coefficients entering the equations of motion. Thus, prediction of flight motion or analysis of observed motion are improved by use of research results.

Previously encountered difficulties with a two-arm flexure (too much structural damping) have been overcome. Wind tunnel tests can now be performed with the model oscillating either in planar or in nonplanar motion, with the structural damping being a fraction only of the aerodynamic damping. Purpose of this study is to investigate aerodynamic interaction in the case of nonplanar motion. Samso did express interest in the study of dynamic stability derivatives for slender biconic configurations up to large angles of attack. The necessary test equipment has been designed. Tests will include the determineation of the sidemoment due to coning motion.

Supporting agency address information: Aerospace Research Laboratory LH, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0040, RADIATION DAMAGE MECHANISMS IN COMPOUND SEMICONDUCTORS
D.C. LOOK, Univ. of Dayton, Graduate School, *Dayton, Ohio* 45409 (F33615-71-C-1877)

AF function - electronic materials, electronic systems survivability, airborne communications, detection. Deficiency - insufficient knowledge of electronic materials in a radiation environment and at high and very low temperatures. Research - investigation of fundamental electron radiation damage mechanisms in II- VI semiconductor compounds through a study of optical, electrical and thermal properties over a range of temperatures. Examination of changes in characteristics due to electron bombardment and ion implantation. Electron and nuclear magnetic resonance studies of radiation damage. How research contributes - measurements of electronic material properties such as magnetic susceptibility, magnetoresistance, magnetic resonance, thermal conductivity specific heat, and optical absoprtion and emission on II-VI compounds and related semiconductors provide knowledge of property changes and stability as a function of temperature. Many properties are determined by and are sensitive to changes in crystal defects and impurity atoms. Because radiation produces such changes, the Air Force requires knowledge of radiation effects in solid state electronics systems and materials. Fast electrons and heavy ion implantation are used to controllably produce defects in materials.

Monitoring of specific properties that are sensitive to the defect structure of a material permit accurate determinations of threshold energies for creating host defects. Optical recombination centers resulting from host defect creation provides a very sensitive measure of the threshold energy. This technique coupled with EPR measurements are used to analyze electron induced damage.

Supporting agency address information: Aerospace Research Laboratory LS, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0041, CRACK GROWTH IN BONDED ELASTIC HALF PLANES
J.G. GOREE, Clemson University, School of Engineering, *Clemson, South Carolina* 29631 (NSG 1104)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0042, OPTIMIZATION OF ABSORPTION AIR CONDITIONING SYSTEMS FOR SOLAR ENERGY APPLICATIONS
E. PERRY, Memphis State University, School of Engineering, *Memphis, Tennessee* 38111 (NAS 8-31189)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0043, CHARACTERIZATION AND MEASUREMENTS OF DEFECTS IN THE VICINITY OF FASTENER HOLES BY NONDESTRUCTIVE INSPECTION
P.F. PACKMAN, Vanderbilt University, School of Engineering, *Nashville, Tennessee* 37203 (F44620-73-C-0073)

The reliable characterization by nondestructive inspection of small defects in the vicinity of fastener holes is one of the top priority needs of the AF. This research program is designed to extend the current investigation in identifying and quantifying those material characteristics needed to insure the reliable detection of crack-like defects associated with fastener holes to include detection of cracks under installed fasteners. Emphasis will be placed on two advanced nondestructive testing techniques, (1) shear wave ultrasonics, and (2) eddy current. The research seeks to identify those characteristics of flaws associated with fastener holes, such as flaw size, its location with respect to fastener, stress state used in producing the flaw, stress state associated with fastener hole, material characteristics associated with production of hole for insertion of the fastener, i.e., scratches, burrs, those material parameters associated with the structural joint containing the fastener hole, such as faying interfaces and sealants, and to quantify those characteristics that influence reliable detection and measurement of small flaws by specific NDT procedures. The analysis equipment and computer software will be tried out at Kelly AFB on actual B-52 and KC-135 aircraft as soon as the program is sufficiently advanced.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0044, NEW TECHNIQUES IN NUMERICAL ANALYSIS AND THEIR APPLICATION TO AEROSPACE DESIGN PROBLEMS
A. MIELE, Rice University, School of Engineering, *Houston, Texas* 77001 (AF-AFOSR-2185-72)

The design of effective aerospace vehicles for the Air Force requires extensive analysis of potential performance capabilities of such vehicles. These analyses involve the optimization of certain performance parameters under a number of constraints which in turn are being also optimized to some extent. For example a re-entry vehicle path may be optimized based on minimal heat transfer from the boundary layer to the body of the vehicle. Typical inequality constraints are upper bound on path inclination, upper bound imposed on the tangential acceleration, normal acceleration and total acceleration. Typical boundary conditions are the desired range and given altitude drop. The proposed research work approaches the optimization problem by the investigation of - solution of nondifferential equations, solution of differential equations including 'stiff' systems, mathematical programming problems and optimal control problems. The research involves the utilization of the sequential gradient-restoration algorithm which was developed by the proposer. The results expected under this research project could be useful in the determination of optimal flight trajectories and optimal aerodynamic shapes. The analysis of survivability of aerospace vehicles can also benefit from the expected results.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0045, EFFECT OF ACOUSTIC DISTURBANCES ON THE STRUCTURE OF TURBULENT FLOWS
A.F. HUSSAIN, Univ. of Houston, School of Engineering, *Houston, Texas* 77004 (NSG 1103)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0046, NONDESTRUCTIVE EVALUATION OF METAL FATIGUE
J.R. BARTON, Southwest Research Institute, *San Antonio, Texas* 78228 (F44620-70-C-0034)

Advanced AF aerospace vehicles require a reliable assessment of the integrity of their structures and probable service performance. Also aircraft which have been in service have to be checked periodically for structural fatigue cracks which may have developed. The objective of this effort is the development and investigation of potential nondestructive evaluation techniques for detecting fatigue damage cracks in metals and for estimating the useful life remaining in a part. The influence of fatigue crack parameters of significance in fracture mechanics upon detailed features of magnetic field perturbation signals from fatigue cracks in type AISI 4340 steel will be investigated. Barkhausen noise method will be used to characterize the residual stress field accompanying the fatigue cracks and ultrasonic surface waves will determine the areas of fatigue crack interface. Laboratory techniques, independent of the nondestructive techniques under study, will determine in as direct and quantitative a manner as possible such parameters as - crack length, interface configuration and area, crack opening displacement, and size of plastic zone at crack tip. On the basis of the above, the present capabilities and limitations of the nondestructive techniques for yielding quantitative measurements of fatigue crack characteristics will be evaluated.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0047, FUNDAMENTAL INVESTIGATION OF FAILURE OF FIBER COMPOSITES
H.F. BRINSON, Virginia Polytechnic Institute, School of Engineering, *Blacksburg, Virginia* 24061 (NSG 2038)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0048, FLIGHT DYNAMICS STUDIES EMPLOYING MAGNETIC SUSPENSION
S.S. FISHER, Univ. of Virginia, School of Engineering, *Charlottesville, Virginia* 22903 (AF-AFOSR-2705-74)

AF flight operations require as complete as possible knowledge of both flight dynamics and fluid mechanics principles and the necessary methods and equipment for making more demanding applications. The magnetic suspension wind tunnel balance is a promising device for obtaining flight dynamic measurements from wind tunnel measurements. This research will provide a demonstration comprising the extension of the capabilities of the magnetic suspension balance through the final step necessary, that is to go from static aerodynamic measurements to the measurement of the damping derivatives that would apply to the freely flying vehicle. Models will be driven in roll aerodynamically at roughly constant roll frequency. A lateral force oscillating at a frequency well above the response frequency of the magnetic suspension system position control will be applied to the model by means of a lateral force magnet coil. Following the decay of initial transient motions, the steady state precession of the model oscillations about the tunnel axis will be ovserved as a function of model Reynolds number, roll rate, and excitation frequency.

Supporting agency address information: AF Office of Scientific Research NA, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

4.0049, ADDITION OF HIGHER ORDER PLATE & SHELL ELEMENTS INTO THE NASTRAN PROGRAM
R. NARAYANASWAMI, Old Dominion University, Graduate School, *Norfolk, Virginia* 23508 (NSG 1117)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

4.0050, WOHLER EQUATION IN CUMULATIVE FATIGUE DAMAGE THEORY
S.C. SAUNDERS, Washington State University, School of Arts, *Pullman, Washington* 99163 (F33615-73-C-4016)

AF function - structural reliability and integrity of aircraft. Deficiency - need for theoretically sound mathematical models for predicting fatigue life. Research - synthesis of crack growth theories in fatigue with some statistical distributions of fatigue life, using the Wohler Equation. How research contributes - better methods of predicting early service failures.

During the first year of this two-year extension, an effort will be made to unify a theory of deterministic crack growth behavior with one of the stochastic theories of fatigue and damage, such as the Birnbaum- Saunders Fatigue Life Distribution, to introduce within this unified theory the variability of the time of fatigue crack initiation and the concept of the distribution of strength, and to make a useful identification of the disposable parameters of the family of distribution functions of the statistical theory, such as the shape parameter and the median life, with crack growth behavior, which will be ascertained from the deterministic aspect of fatigue theory. During the second year, attention will be directed to an attack on the estimation problems that arise for the unknown parameters of the unified model and a determination of the optimum use of the limited amount of data available, to a study of the variation in those quantities, such as the safe-life, which are of interest in design, as a function of the variation in the proposed loading spectrum, and to an examination of the possible modifications to the unified theory necessary to make it applicable to the calculation of life length behavior of structures fashioned from composite materials instead of metallic ones. Because of their applicability to both metallic and non-metallic materials and structures, the results will be of interest to both AFML/LL and AFML/LN.

Supporting agency address information: Aerospace Research Laboratory LB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production And Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, AIRGLOW RESEARCH
S.T. WU, Univ. of Alabama, School of Engineering, *University, Alabama* 35486 (NAS 8-29543)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0002, TECHNIQUE TO DETECT IMPACT ON WATER QUALITY OF RECREATIONAL USE AND DEVELOPMENT
S.K. BRICKLER, Univ. of Arizona, Agricultural Experiment Sta., *Tucson, Arizona* 85721 (ARZT-0206-4168-187)

Objective: Develop techniques for detecting recreation impacts on water quality by: Using aerial and on site color infrared photos; Collecting stratified water samples to test for bacterial densities and types, chemical concentrations; Compare on site water sampling with data from color infrared photos; Develop field procedures for testing water bodies; and examine limologic carrying capacity.

Approach: Aerial photos will be taken at 2500 ft., and on site photos will be taken of the immediate watershed. Water samples will be collected at predetermined stations of a lake. Color infrared photos and data from water samples will be correlated.

Progress: The impact of recreation use and development on water quality and the techniques for determining these impacts was initiated in June of 1972 and continued until August 1972. Three lakes and two streams were selected for analyses. These areas were chosen on the basis of intensity of recreation use and development on the immediate watershed and water body. Bacterial analysis, turbidity, temperature and some chemical analyses were conducted in each study area to determine water quality over the intense summer use period. Although data indicate that certain uses of the lakes and adjacent watershed could have detrimental effects on water quality, at present levels of use, no serious problems are likely to be encountered. The most serious problem, in terms of fecal coliform numbers, appears to be the construction of summer homes with septic tank waste disposal systems around isolated arms of lakes where less water mixing occurs. Further investigation should allow the determination of the exact contributions of these facilities to lakes and to a better set of management criteria.

SUPPORTED BY Arizona State Government - Phoenix

5.0003, APPLICATION OF REMOTE SENSING FOR NATURAL RESOURCE ANALYSIS
E.B. FISH, Univ. of Arizona, Agricultural Experiment Sta., *Tucson, Arizona* 85721 (ARZT-2014-4168-026)

Objective: Develop ground truth and image class grouping criteria for the definition of a hierarchical classification system of site- vegetation units (legend) as a basis for natural resource inventory and monitoring using remote sensing techniques. Develop imagery interpretation aides and keys to facilitate identification of subdivisions within the site-vegetation systems. Develop methods of compiling and analyzing the data to maximize the utility of the techniques to natural resource managers.

Approach: Multispectral imagery will be used to delineate image patterns. Image classes will be grouped as a basis for planning field sampling and stratification for collection of ground-truth data. Field sampling of vegetative, soil and physiographic characteristics will be conducted to develop classification system compatible with image groupings. The symbolic and descriptive legends will be developed based on these groupings.

Progress: Emphasis during the year has been to collect ground truth data on vegetation-sites within mapping units delineated on aerial photo mosaics. Some mapping units have been described on the basis of drainage density and pattern and percentage ridges, bottoms, and slopes. The techniques being developed appear to have usefullness for resource inventory and planning in complex vegetation-soil-topography situations.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0004, THE POLARIMETER & MULTISPECTRAL RADIOMETER AS REMOTE PROBES OF AEROSOLS
J.G. KURIYAN, Univ. of California, School of Letters, *Los Angeles, California* 90024 (NSG 1106)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0005, ATMOSPHERIC OZONE DETERMINATION STUDY
R. ANGIONE, Calif. State Univ. & Colleges, School of Liberal Arts, *San Diego, California* 92115 (NAS 5-20772)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0006, STUDY OF PLANETARY METEOROLGY
C. RIEGEL, Calif. State Univ. & Colleges, Graduate School, *San Jose, California* 95114 (NSG 2047)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0007, IONOSPHERE VHF SCATTER STUDIES
B.B. BALSLEY, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ42853)

Project objective: To investigate various aspects of the ionosphere (both in the equatorial and auroral regions) that can be examined by VHF-scatter techniques.

Current year plan: Typical investigations will include studies of equatorial spread-F, equatorial sporadic E, and auroral E-region scatter phenomena. These studies will incorporate state-of-the-art radar techniques involving portable systems and minicomputers for on-line spectral analysis.

Progress report: One experimental trip was made to Jicamarca during FY 73, in conjunction with Professor D.T. Farley and B.G. Fejer of Cornell University. During this trip we gathered data on: (1) high spatial-resolution studies of the electrojet; (2) similar studies of equatorial spread F; and (3) electrojet height variations (of less than one km) due to durinal and gravity wave effects.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0008, COLLISION PROCESSES
E.E. FERGUSON, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ45931)

Project objective: Basic research, both experimental and theoretical, on atomic and molecular processes pertinent to the earth's atmosphere.

Current year plan: Continuation of atmospheric ion chemistry, both laboratory rate constant measurements and theoretical analysis. Extension to neutral atmospheric reactions.

Progress report: Energy dependencies for the important E- and F- region ion-neutral reactions have been measured using newly developed laboratory technology.

The D-region positive and negative ion reaction schemes were extended by the measurement of additional reactions.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0009, GRAVITY WAVES
W.H. HOOKE, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8AA70971)

Project Objective: To theoretically study (a) the generation of acoustic-gravity waves by the earth's atmosphere and oceans, (b) the propagation of the waves through the earth's atmosphere, and (c) the subsequent interaction of the waves with the earth's atmosphere.

Current Year Plan: Continue to study role played by acoustic- gravity waves in boundary-layer momentum and energy transport. Examine wave generation by shear instability, penetrative convection, and orography.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0010, IONOSPHERIC PHYSICS
A.G. JEAN, U.S. Dept. of Commerce, Environ. Research Laboratories, *Boulder, Colorado* 80302 (8DJ40720)

Project objective: To advance knowledge and understanding of the ionosphere via research and experimentation to more effectively use the upper atmosphere resources in activities of national importance. Development goals for service include prediction of ionospheric/magnetic storms minimizing natural disturbances to radio communications, electric power distribution system, telephone system, etc.

Current year plan: Will commence recording signals from ATS-F radio beacon satellite (launch date June 1974), data analysis will take place in FY 1975. Plan to conduct ionospheric observations during large-scale rocket firing at Wallops Is., June 1974. Will provide research data. Temperate latitude F-region model will be extended upwards to plasmasphere. Use an harmonic analysis method to provide description of ionospheric parameters. Required in research and useful to EDS.

Progress report: Developed ionospheric data base, supplied to EDS. Theoretical model of equatorial F-region developed to explain effects of E x B. With instrumentation group, completed ground equipment for acquisition of radio signals from the ATS-F radio beacon satellite.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0011, MACHINE PROCESSING OF ERTS MULTISPECTRAL IMAGERY
R.L. HANSEN, U.S. Dept. of the Interior, Bureau of Reclamation, *Denver, Colorado* 80225

Objective: The high volume of data available on a single ERTS satellite image makes it beyond man's capability to manually extract all usable data in the proper format. The ERTS multispectral imagery is available on computer compatible tapes for automatic processing and plotting. Newly installed computer facilities available at the E&R Center will be utilized to machine process the imagery and extract thematic data for use in agricultural studies, hydrology, environmental inventories and ecology studies.

Approach: All possible use will be made of existing software to interface with the CDC computer system. Several private companies, universities, and Government agencies have developed computer software systems and interpretive techniques for machine processing imagery in a variety of machine languages. Additional software will be written and existing software will be modified where necessary.

Current plans and/or progress: This is a new program starting in FY75. A literature search is underway to locate available software.

SUPPORTED BY U.S. Dept. of Interior - Bu. Reclamation

5.0012, STUDY-APPLICATION OF REMOTE SENSING FOR PREDICTION & DETECTION OF THERMAL POLLUTION
T.N. VEZIROGLU, Univ. of Miami, School of Engineering, *Miami, Florida* 33124 (NAS10-8740)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0013, REMOTE SENSING OF EFFECTS OF LAND USE PRACTICES ON WATER QUALITY
D.H. GRAVES, Univ. of Kentucky, School of Agriculture, *Lexington, Kentucky* 40506 (NAS 8-31006)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0014, FURTHER DEVELOPMENT OF A GLOBAL POLLUTION MODEL FOR CO, CH4, AND CL-20
L.K. PETERS, Univ. of Kentucky, Graduate School, *Lexington, Kentucky* 40506 (NSG 1111)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0015, NEXT GENERATION UPPER AIR SYSTEM (NEXAIR)
R. WATERS, U.S. Dept. of Commerce, Equipment Developmnt. Lab., *Silver Spring, Maryland* 20910

Technical objective: Development of an upper-air sounding system which will satisfy the macro-, maso-, and near microscale requirements of the 1970's for wind, temperature, pressure and humidity data.

Approach: Objective will be arrived at in the following manner: 1. Design and develop prototype sonde and ground system with real time operating software. 2. Equip van and run experiment to evaluate geographic coverage, spherics and full power OMEGA. 3. Implement operational evaluation at Tampa and Sterling. 4. Develop shipboard, portable and mobile accessories. 5. Prepare specs, drawings and final report.

Progress: 1) Development of a completely frangible (safe) lithium radiosonde. 2) Adaptation and integration of NEXAIR with the present Upper-Air Mini-Computer. 3) Assembly of two systems for a one year operational experiment.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0016, THE USE OF REMOTE SENSING IN EVALUATION OF MICHIGAN RESOURCES
A.L. ANDERSEN, Michigan State University, Agricultural Experiment Sta., *East Lansing, Michigan* 48823 (MICL01146)

Objective: Investigate the potential of remote sensing from satellites for the evaluation of agricultural crops, forests, wetlands, soils, soil conditions, and glatial landforms.

Approach: Correlate single-band and composite imagery and assess automatic processing techniques for mapping and crop estimation. Obtain 'ground truth' for crops, soils, forests and natural resources and compare to MSS and photographic imagery from air and space.

Progress: Computer recognition accuracies in the order of 85-90% were obtained for corn, forest and soybean cover types and non-vegetated areas were 100% recognizable from ERTS-1 imagery obtained over Eaton Co. MI on 25 Aug 72. Band 4 showed three signal levels associated with well drained, poorly drained, and very poorly drained (organic) soils. Band 5 was similar but less effective than Band 4. Computer recognition processing was more successful than two channel ratio processing (Bands 7/5) identifying bare, organic soils. The two methods were equally effective in recognizing bare mineral soils. Spatial resolution of ERTS MSS is such that a single resolution element will contain a mixture of two or more scene materials. Techniques developed by ERIM under subcontract for estimating the proportions of unresolved materials in individual resolution elements of MSS data are to be applied to crops, forests and soils. To overcome the difficulties for the manual interpretations of associating individual ERTS MSS pixels with corresponding ground locations, a computer-assisted procedure for assigning ERTS pixels to specific fields or plots has been developed. For preparation of vegetation maps, image clarity is best in bulk products. Most vegetation type information is contained in Band 5. Compositing with Band 7 removes confusion with eutrophic water bodies. Forest stands of 80-100 acres were easily identified from Band 5 transparancies. More information can be extracted from ERTS data by working with digital processing than with photographic products.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0017, UHF/DATA COLLECTION PLATFORM RADIO SET
H. HACKER, U.S. Dept. of Commerce, Data Buoy Office, *Bay St. Louis, Mississippi* 39520 (DOC 1-35287)

Objective: Develop a Mobile Data Collection Platform Radio Set (DCPRS) that will enable the reliable reporting of environmental parameters from data buoys via the Geostationary Operational Environmental Satellite (GOES).

Approach: NDBO had a contract with Magnavox to modify the land based DCPRS units that were developed for the National Environmental Satellite Service (NESS). The modification included the addition of a power amplifier, automatic acquisition receiver, DC power converter, and mechanical redesign to adapt to the buoy environment.

Current plans/progress: The mobile DCPRS units were delivered to NDBO in early 1974. The units have had a system testing capability (STC) added to enable independent testing via GOES from a buoy platform after the satellites are launched. Hardware reliability and performance testing of the DCPRS are presently taking place at NSTL.

SUPPORTED BY U.S. Dept. of Commerce - N.O.A.A.

5.0018, SNOW DEPTH
T.L. HANSON, Montana State University, Agricultural Experiment Sta., *Bozeman, Montana* 59715 (MONB00114)

Objective: Feasibility of using natural radiation for measuring snow water equivalent using airborne sensing equipment. Obtain data for correlation between snow accumulation on the ground and that which can be expected on roofs.

Approach: Select a site with past data on snow water equivalent to establish attenuation of natural radiation. If necessary, enhance background radiation with naturally-occurring materials. Make flights throughout the snow season to obtain snow water equivalent data which can be checked against data obtained by Soil Conservation Service. A low-cost building will be constructed in the immediate vicinity of the area to be used for airborne measurement of snow accumulation on the ground and measurement of snow load on the roof will be made throughout the winter season.

Progress: Site preparation was nearly completed. Seven tons of euxenite sand was spread on an area that was 220 ft. long and 60 ft. wide (average). Also, a 20 ft. by 20 ft. structure has been erected near the site. The roof pitch is four on twelve. The hydraulic equipment to measure the roof load has not been installed in the building as yet. Two on-site visitations have been made since the first snow has fallen. The snow was 28 inches and 50 inches deep with a snow water equivalent of 7 inches and 10 inches, respectively. The snow distribution on the roof was not uniform for either visit. The snow loads were estimated as 4,600 lbs. and 9,200 lbs. One flight was made in conjunction with the first site visitation. With the instruments set to count all incoming radiation, the reading was 2,000 counts per minute. By closing the window or screening out some of the noise and also some of the radiation, the count dropped to 1,000 counts per minute. The second flight was aborted because of a snow squall in the site area. This flight will be made when the weather clears.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0019, ECOSYSTEM STUDY OF THE ELK CREEK DRAINAGE IN WESTERN MONTANA
L.K. FORCIER, Univ. of Montana, School of Forestry, *Missoula, Montana* 59801 (MONZ03001)

Objective: Ascertain the safe limits of forest manipulation in the Northern Rocky Mountain Region.

Approach: Data on the biotic and abiotic components of matched, undisturbed, small watersheds will be obtained. After a calibration period, specific watersheds will be subjected to commercial land-use management operations. The resulting changes in the ecosystem will be continuously monitored during and following the management operations. Concurrent with this intensive research, extensive studies will be conducted on previously harvested forest throughout the northern Rockies. Information from the extensive study sites and from the intensive research will be used to develop a model for forest function for the region and for the forest's response to various levels of management intensity.

Progress: In the first two and one-half years of the Lubrecht Ecosystem Project, much progress has been made in ecologically describing and watershed study area in the North Fork of Elk Creek. Studies of the composition, pattern and phenology of the tree, shrub and herb layers have developed as scheduled and are continuing. The boundary survey and arboreal vegetation analysis of a proposed manipulated water shed has been completed. A model of release potential in Pseudotsaga mensessi has been constructed, and study of the relationship of important plant indicators and abiotic parameters was initiated. Investigation of the watershed's fauna continued to be primarily directed at the small mammals and birds of the forest. Bird and small mammals censuses were made on diverse habitats within the study area, and significant progress has been made in determining the relationship forest structure and the diversity of avian populations. The chemical composition of the bedrock and the soil on the control study area has been determined. Seismic refraction indicated that the water impermeability of the bedrock is suspect, but modification of the original study design is underway. Monitoring of several climatic parameters continued. Analysis procedures for several nutrient inputs in the vicinity of the study area was perfected and development of an output network progressing. Important recent aerial photographic coverage of the intensive study area was used to produce 5 ft. contour maps of the control watersheds.

SUPPORTED BY U.S. Dept. of Agriculture - C.S.R.S.

5.0020, STUDY OF ELASTIC WAVE PROPAGATION IN THE MOON
R.A. PHINNEY, Princeton University, School of Engineering, *Princeton, New Jersey* 08540 (NSG 7080)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

5.0021, CALIBRATION AND PERFORMANCE EVALUATION OF DOD ALTIMETERS
H. FISHEL, U.S. Army, Res. Institute, *Alexandria, Virginia* 22314

The objective is to formulate a technique and identify a test area for calibrating, evaluating and monitoring the performance of a satellite altimeter sensor used for direct determination of the geoid.

Assume that the satellite altimeter will be calibrated over a suitable land area instrumented with existing satellite tracking systems to determine the satellite ephemeris in either a geometric or dynamic mode. Also assume that geodetic control in the area are known. The distribution, acquisition rate and accuracy of the ground trackers, and corresponding orbit will be studied that will enable the calibration and continued performance of the altimeter to within an accuracy of plus or minus one meter. The test area selected for calibrating the altimeter must provide an optimum radar return signal and provide for daily checks of the altimeter performance. Ocean areas will be excluded as possible test sites due to changes in sea state.

Supporting agency address information: OCE ETL Research Institute, Alexandria, Va.

SUPPORTED BY U.S. Dept. of Defense - Army

5.0022, GEOPOTENTIAL DETERMINATION FROM SATELLITE-TO-SATELLITE TRACKING
A. MANCINI, U.S. Army, Res. Institute, *Alexandria, Virginia* 22314

To determine the potential of the defense navigation satellite (DNSS) to provide positions of low orbiting geodetic satellites overland and sea. This determination will elimainate errors in orbit predictions due to the gravitational field. To determine the gravity recovery capabilities resulting from-satellite to satellite velocity measurements between the high and the low altitude satellite.

Using the 20 satellite concept of DNSS at synchronous altitudes, a map of positions and velocity determinations for the low orbiting satellite will be developed reflecting the prodicted measuring capability of DNSS for range and range rate. The position components will be evaluated to determine its use for altimeter or drag free satellite and the velocity map-will be used in the total energy integral to-determine its capability to recover the structure of the gravity field using various representations of the potential energy in the total-energy integral.

Supporting agency address information: GCE ETL Research Institute, Alexandria, Va.

SUPPORTED BY U.S. Dept. of Defense - Army

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, INVESTIGATIONS OF THE INHIBITORY EFFECTS OF TOCOPHEROL VITAMIN E ON FREE RADICAL DETERIORATION OF CELLULAR MEMBRANES
D. RICHARDSON, Oakwood College, Undergraduate School, *Huntsville, Alabama* 35806 (NSG 8017)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0002, ADVANCED SIMULATION IN UNDERGRADUATE PILOT TRAINING UTILIZATION
J.F. SMITH, U.S. Air Force, Human Resources Laboratory, *Chandler, Arizona* 85224

To establish task/study designs and appropriate priorities for investigation of the application of advanced simulation to undergraduate pilot training.

A complex T-37 simulation facility will be used for this investigation. Recent psychological, training and simulation concepts are being used to define an effective research program. The result will be an empirically derived simulator or family of simulators which will effectively exploit modern simulation technology in undergraduate pilot training.

Supporting agency address information: AF Human Resources Laboratory, Ft. Williams AFB, Arizona 85224

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0003, THE INSTRUCTOR PILOT'S ROLE IN SIMULATOR TRAINING
V.J. SHARKEY, U.S. Navy, Training Equipment Center, *Orlando, Florida* 32813

The objectives of this effort are to define the role of the instructor pilot in simulator training, to determine the feasibility of developing training for instructor pilots and to specify the design of the instructor station for use by instructor pilots and training device personnel.

The effort will consist of the following: (a) review prior and current research and development relevant to the design and use of instructor consoles with particular emphasis on instructor stations for OFT's, (b) specify pilot instructor training goals in OFT utilization, (c) develop a candidate design for an instructor pilot console based on the above specifications, (d) carry out a series of experiments in the simulation facilities, to specify the final design of an instructor pilot console for use with an OFT, and (e) demonstrate the feasibility of using the console as an instructor pilot training device.

Supporting agency address information: Naval Air Systems Command 340F, Washington, D.C. 20361

SUPPORTED BY U.S. Dept. of Defense - Navy

6.0004, LYMPHOIC CELL KINETICS
B.R. FOSTER, Grambling College, Undergraduate School, *Grambling, Louisiana* 71245 (NSG 9014)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

6.0005, DYNAMIC, CONTROLLED TRI-GAS MIXING DEVICE FOR DELIVERY OF BREATHING GASES
A.J. SIPIN, Anatole J. Sipin Company, *New York, New York* (F41609-73-C-0028)

Future aircraft oxygen (O2) delivery systems may deviate considerably from present conventional techniques of providing crew members with supplemental O2 at altitude. Two concepts are of particular interest to the Air Force since they both reduce O2 wastage and, therefore, are compatible with the revolutionary idea of inflight O2 generation. Systems which will selectively capture O2 from jet engine bleed air and supply it to crew members will eliminate expensive liquid and gaseous O2 logistical support at 'bare base' operations. The two concepts of O2 delivery which require additional experimental testing are phase-dilution and closed-loop breathing systems from the standpoint of O2 conservation and physiologic acceptability. A considerable segment of the needed research calls for experiments in which human subjects will breathe high concentrations of O2 pre-mixed with exact amount of carbon dioxide (CO2). Other studies will require that accurate mixtures of O2 and nitrogen (N2) or O2, N2 and CO2 be supplied to subjects at high flow rates. This effort provides a system for use within various work units under task 7164-17.

Presently, two methods exist for supplying various mixtures of these gases to test subjects. Both methods are very expensive in terms of money and/or manpower. They are- 1/ establishing the desired gas mixture in large environments, and 2/ buying high pressure cylinders of specially analyzed pre-mixed gases from commercial suppliers at high cost and, usually, less than desirable accuracy. To circumvent the problems associated with present methods of supplying gas mixtures to subjects in future planned experiments, the construction of an automatic, dynamic 3-gas mixing device is proposed. Basically, the system would very accurately prepare mixtures of 2 or 3 gases in any combination using automatic feedback control of variable orifice lines to banked high pressure cylinders of 100 percent O2, N2 and CO2. The mixed gases would be directed to a suitable reservoir from which the subject could breathe at flow rates up to 250 l/minute which qualifies the unit for exercise studies. The system would also have the capability of delivering 100 percent O2 at very low flow resistance, thus eliminating the potential fire hazard associated with the exposure of men to hyperoxic chamber environments. (Text Abridged)

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0006, RESEARCH ON PERMANENT AND TEMPORARY SHIFTS IN HEARING THRESHOLD PRODUCED BY EXPOSURE TO AF NOISE
D.J. LIM, Ohio State University, School of Medicine, *Columbus, Ohio* 43212 (F33615-74-C-4049)

The objective of is to discover fundamental information required to develop protection for Air Force personnel subjected to noisy environments. There is a need to study the response of the nervous system to the stresses that are expected to occur in aerospace environments in order to determine the fundamental principles for establishing protective devices and techniques to insure safety and unimpaired performance of the nervous system. A thorough knowledge of the biochemical activity and anatomical changes within the inner ear is essential to making intelligent judgements on possible methods of protection.

Experimental animals will be trained to produce behavioral audiograms prior to exposure to sound environments similar to those expected in Air Force operational conditions. The results of these behavioral methods will be compared with anatomical changes using scanning electron microscope techniques. A detailed study will be made on the anatomical relationship between the tectorial membrane and the hairs of the sensory cells. Human subjects will be used to define the level of long-term exposure that produces changes in auditory acuity. The environmental conditions for human experiments will be chosen only after results from animal studies.

Supporting agency address information: 6570 Aerospace Medical Research Lab BB, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0007, CONTROL DISPLAY INTERGRATION
J.P. HORNSETH, U.S. Air Force, Aerospace Med. Res. Lab., *Dayton, Ohio* 45433

The purpose of this work unit is to conduct human engineering research aimed at developing and evaluating new concepts for the control of weapon systems and the display of control information. Areas of study will include the use of the head and eye to direct fire control systems, operate telecraft, provide weapon system guidance, provide control reconnaissance systems, and select display information. Customers include the following programs, projects, system concept options, and required technologies- Project 5973, Program 698DF, TPG ID-RTA- Weapon Delivery Envelope, TPG CS-RTA- HMS/D Fire Control, Target Designation and Guidance, TPG CA-RTA- Digital Avionics Man-Machine Interface, RPG RPV-RTA- RPV Sensor Display Data, and SCO ID/2- Remotely Piloted Air-To- Ground Strike System.

The studies will be conducted in laboratory, simulated flight, and flight environments. The first series of technical efforts in support of this work unit include the following- 1/ studies of head

and eye control to be conducted in the laboratory. The first of these studies will be concerned with establishing baseline head and eye tracking performance. 2/ Telecraft control/display studies to be conducted in the laboratory and in the field. The first laboratory studies will be concerned with telecraft control using predictor displays. The first field studies will be concerned with determining the optimum sensor field-of-view and control dynamics required in a telecraft to successfully acquire and track a target. 3/ Visually-coupled systems inflight studies to be performed on the AMD low performance test-bed (a modified c-131 aircraft). The first study will be concerned with TV target detection performance as a function of panel versus helmet-mounted display, head position sensing versus stick control, and position versus rate control.

Supporting agency address information: 6570 Aerospace Medical Research Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0008, SUBJECTS FOR HUMAN FACTORS APPLIED RESEARCH

W. HOVEY, Univ. of Dayton, School of Engineering, *Dayton, Ohio* 45409 (F33615-74-C-4045)

The primary purpose of this contract is to procure the services of student volunteers to serve as experimental subjects in experiments conducted by and for the human engincering division of the 6570 aerospace medical research laboratory for human factors applied research. The secondary purpose is to procure professional-technical effort associated with requirements herein specified.

Generally, this effort will be involved in experiments to determine human performance capabilities and limitations as they relate to the design of Air Force equipment and systems and to establish design principles and criteria for optimum utilization of human performance capabilities. For example, one major set of studies will employ university students as subject operators in a simulated drone control facility. The purpose of these studies will be to determine operator capabilities for controlling remotely piloted vehicles. These experiments will be conducted at the human engineering facilities at Wright-Patterson AFB. Screening and pretesting of subjects will be done by the contractor at the contractor's facility.

Supporting agency address information: 6570 Aerospace Medical Research Lab HE, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0009, DEVELOPMENT OF AN AIRCREW FLIGHT PHYSIOLOGICAL DATA ACQUISITION SYSTEM

G. ZIRELY, Sci Systems Incorporated, *Houston, Texas* (F41609-73-C-0009)

The performance capabilities and operational requirements for current aircraft and programmed advanced weapon systems expose aircrew members to potentially hazardous environments. In order to obtain an understanding of the potential effects of such environments, it is necessary to evaluate the physiologic response of aircrew members in those environments and to correlate the physiologic effects with flight parameters. In addition, man's real requirement for oxygen during various piloting tasks has not been evaluated since the late 1940's and then only in cargo aircraft. In order to accuractely size oxygen delivery requirements and overall specifications for aircraft oxygen systems, it is necessary to measure oxygen consumptions of crew members during actual flight. At present there is no system capable of measuring oxygen consumption, pulmonary lung volumes, such as forced expiratory vital capacities, electrocardiograms, and flight parameters such as g fields simultaneously. The development of such a system will permit a better assessment of the physiologic hazards of flight, a data base for specification development for oxygen breathing systems and life support systems, and data for comparison with that obtained from fixed or moving base simulators. It is the purpose of this effort to obtain a system to serve these research functions.

The selected contractor will furnish the necessary resources to design, fabricate, test and deliver a physiologic data acquisition system for evaluating aircrews during flight. The effort will be divided into two phases- Phase I, System Design, 'Bread-Board' System Fabrication, and Test, and Phase II, Fabrication and Delivery of A Flight System. At the end of Phase I, the 'Bread-Board' System will be delivered to the Government for test and acception. The system will be small in size, and consist of sensors, signal conditioners, recording system, and power supply. The system will operate independently of the aircraft avionics but integrate with the aircrew members' personal equipment, e.g., oxygen equipment. The system will provide the capabilities to acquire data on oxygen consumption, pulmonary lung volumes, such as tidal volumes, minute volumes and forces expired vital capacities, electrocardiograms, acceleration field, and voice or time line.

Supporting agency address information: USAF Sch (Text Truncated - Exceeds Capacity)

SUPPORTED BY U.S. Dept. of Defense - Air Force

6.0010, DEVELOPMENT OF LABORATORY TEST BED FOR PILOT PERFORMANCE STUDIES (TECHNOLOGICAL BASE)

D. MEEISTER, U.S. Army, Org. & Systems Research Lab., *Arlington, Virginia* 22209

(1) To develop apparatus needed for the controlled experimental investigation of visual factors influencing helicopter pilot performance- (2) To conduct laboratory studies to isolate the visual parameters critical for visually aided flight at Nap-Of-The-Earth (NOE) in night operations- (3) To develop by means of controlled experimentation a specification of the visual parameters to be included in the design of advanced sensor displays. Development of the device should permit investigation of significant pilot research problems (e.g., NOE flight at night) which would otherwise be extremely hazardous to perform.

(1) To develop general performance requirements for the laboratory test bed- (2) To develop detailed design specifications and drawings of the required apparatus- (3) To conduct appropriate research aimed at determining those factors responsible for pilot proficiency.

Supporting agency address information: OCRD Army Research Institute Organizations and Systems Research Laboratory, 1300 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Army

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, PROBLEM CONTROLLED GRID GENERATION FOR THE NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

P.S. JENSEN, Lockheed Missiles & Space Co., *Palo Alto, California* 94304 (F44620-71-C-0109)

The operational functions of the AF and the AFSC require the numerical solution of elliptic partial differential equations. Present numerical analysis methods approximate the solution in the nodes of a grid or mesh which is located in the finite region where the elliptic partial differential equation is defined. The placement of this grid has traditionally been determined by intuition and convenience. The proposed research program aims to determine a more rational basis for the placement of grid nodes. The approach will be to use the local energy function, which arises naturally in a variational finite difference or finite element method, to dictate the local nodal density. The initial grid will be obtained by using a proposed iterative solution method. The energy function from this solution will then be used to drive a density controlled grid generating computer program to produce an improved grid. The proposed program will investigate finite difference techniques, finite element techniques and will perform comparative evaluation of both techniques. The results previously obtained have culminated in computer program modules. The proposed effort will improve such modules and will integrate them into a larger computer program to handle the nonlinear static, stability and dynamic analysis of shell structures.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0002, EIGENVALUE INEQUALITIES, COMBINATORIAL MATRIX THEORY AND APPLICATIONS
M. MARCUS, Univ. of California, School of Letters, *Santa Barbara, California* 93106 (AF-AFOSR-2164-72)

The design of effective aerospace vehicles requires extensive analysis of structures. The buckling and stresses on panels of the vehicle structure are critical aspects that are normally studied before the final specifications for the vehicle are firmed up. The structural analysis problem involves the calculation of eigenvalues and eigenvectors of large matrices. At present large amounts of computer time is used with searching routines for such parameters. This research proposal attempts to determine the exact location of the eigenvalues of a very large matrix by the use of strong eigenvalue inequalities. The importance of this type of work cannot be overstated. Almost any type of problem involving oscillatory systems requires good knowledge of location of the eigenvalues. Advances in this area will allow researchers at the laboratory to reduce the use of computer time, reduce the time needed for a complete structural analysis and solve more complex problems related to future aerospace vehicles.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0003, CONFERENCE ON CONSTRUCTIVE AND COMPUTATIONAL METHODS FOR DIFFERENTIAL AND INTEGRAL EQUATIONS
R.P. GILBERT, Indiana University, School of Arts, *Bloomington, Indiana* 47401 (AF-AFOSR-2674-74)

A number of problems related to aerospace vehicles remain unsolved. For example, the laminar and turbulent layer flow phenomena which affects the design of new aerospace vehicles, the design of external stores, etc, is not fully understood. The main reason for this is that the nonlinear partial differential equations proposed cannot be solved analytically or even numerically. The same thing happens to problems in gas dynamics, plasma heating, shock wave compression etc. Many numerical methods are available for solving specific problems in applications and using specific types of computer architecture (sequential). As new generations of computers evolve, namely parallel processing, it becomes necessary to survey the field of numerical analysis in the light of such hardware. The proposed conference will get together ten leading mathematicians which possess diverse background in applications. This group aims to survey the state of the art in solving nonlinear differential equations and integral equations with the new computer hardware in mind. Such conference would have the objective of not only coordinating the work of the active researchers in this area, but would also supply a mean through which applied mathematicians and engineers could become more acquainted with the new methods now available for solving problems of applications. The proceedings of this conference will be published.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

7.0004, NONPARAMETRIC AND SEQUENTIAL ANALYSIS OF LIFE TESTING AND RELIABILITY PROBLEMS
A.P. BASU, Univ. of Pittsburgh, School of Arts, *Pittsburgh, Pennsylvania* 15213 (AF-AFOSR-2352-72)

It is important to establish the capability of evaluating the reliability of complex aerospace systems on the basis of a minimum number of observations. This may be due to the destructive nature of the testing, or to the amount of time and the cost involved. Again, in a typical life testing problem, it may not be realistic to assume that all the items under test are put to test at the same time. Further, in many physical situations, it is important to make early decisions about a process based on only a few observations. For all these reasons, it is important to develop suitable analytical techniques for handling aerospace problems involving incomplete data in general and life testing and reliability data in particular. The central goal of this research program is the development of such techniques. Particular emphasis is placed on fixed sample and sequential analysis techniques most suited for life testing and reliability problems. These involve nonparametric life testing procedures, and sequential life testing. Under the first heading, two sample problems are considered in order to compare the efficiency of the savage statistic with respect to other available tests. Under the second heading, suitable confidence interval estimation procedures are being developed based on the savage statistic, and modifications of it.

Supporting agency address information: AF Office of Scientific Research NM, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, WAVES AND INSTABILITIES IN STEADY-STATE HIGH BETA PLASMAS
F.F. CHEN, Univ. of California, School of Engineering, *Los Angeles, California* 90024 (AF-AFOSR-2339-72)

Knowledge of interactions within high-beta plasmas is essential for development of nuclear weapons x-ray simulation capabilities. This research will investigate plasma phenomena under high density/low temperature conditions. This research will provide a unique capability to examine high density, high beta plasmas under controlled laboratory conditions. Wave and instability development under high beta can disclose new processes and interactions in plasma, provide better understanding of plasma evolution, and give insight to new scientific interpretation and prediction capabilities. The research may also provide better tools for investigating anomalous resistivity and developing stabilization mechanisms for plasmas.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0002, PROPERTIES OF NEW SUPERCONDUCTING MATERIALS
T.H. GEBALLE, Stanford University, School of Engineering, *Palo Alto, California* 94305 (AF-AFOSR-2435-73)

High temperature superconducting materials are needed for application in airborne multimegawatt power generation and conditioning systems. Research specifically directed toward the synthesis and characterization of high transition temperature metallic compounds can provide a greater margin of design efficiency and operational reliability than presently available superconductors. The performance of high field magnets and solenoids, electric motor windings, superconducting rotors in power generators, transformers and induction energy storage systems could be significantly improved if the upper critical field, the current-carrying capacity and the critical transition temperature of the superconducting material could be enhanced. This research involves the synthesis and characterization of new and unusual superconductors. A variety of techniques such as vapor transport, electrolysis, electron-beam evaporation, sputtering and high pressures are used in synthesis. Thermal, optical, electrical and magnetic measurements are used to characterize the superconducting properties. Anisotropic charge transfer complexes of layered transition metal dichalcogenides with a variety of organic intercalates and thin films of A-15 compounds of niobium and vanadium with group III and group IV elements are being investigated.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0003, ENERGY RELEASE IN SOLAR FLARES BASED ON OSO-5 DATA
P.A. STURROCK, Stanford University, School of Humanities, *Palo Alto, California* 94305 (NSG 7092)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0004, CRYSTALLOGRAPHIC INSTABILITIES AND HIGH TEMPERATURE SUPERCONDUCTIVITY
B.T. MATTHIAS, Univ. of California, Graduate School, *San Diego, California* 92038 (F44620-72-C-0017)

High temperature superconducting materials are needed for application in airborne multimegawatt power generation and conditioning systems. Research specifically directed toward the synthesis and characterization of high transition temperature metallic compounds can provide a greater margin of design efficiency and operational reliability than presently available superconductors. The performance of high field magnets and solenoids, electric motor windings, superconducting rotors in power generators, transformers and induction energy storage systems could be significantly improved if the upper critical field, the current-carrying capacity and the critical transition temperature of the superconducting material could be enhanced. This research involves the synthesis and characterization of new ternary, pseudoternary and quaternary metallic superconducting compounds. In addition to A-15 structures, non-cubic crystal structures with high critical transition temperatures are being sought. Lattice instabilities and metastable phases are being investigated. A basis for predicting the existence of high TC multicomponent metallic superconducting compounds is being formulated.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0005, ELECTRONIC STRUCTURE AND PROPERTIES OF SUPERCONDUCTING MATERIALS
A.J. FREEMAN, Northwestern University, School of Arts, *Evanston, Illinois* 60201 (AF-AFOSR-2012-71)

To develop the technology sought in Air Force research planning objectives in electromagnetic materials and devices, it is necessary to properly exploit the phenomenon of superconductivity and characterize the properties of superconducting materials. The electronic interactions responsible for the observed superconducting properties of several important classes of materials is being investigated both experimentally and theoretically. These materials include - the layered transition metal dichalcogenides which show highly anisotropic conductivity, network and cage materials and the pseudobinary alloys. Quanitative statements about contributions of the 'impurity' metal levels to electronic structure and transport properties of the ternary superconducting compounds are also being sought. The modulation of superconducting properties such as critical transition temperature and the critical magnetic field with alloying, and compositional and structural changes is being systematically examined. The characterization of high temperature superconducting materials is being emphasized.

Supporting agency address information: AF Office of Scientific Research NE, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0006, ELECTRON TRANSPORT PROPERTIES OF METAL OXIDES
C.N. RAO, Indian Inst. of Technology, *Kanpur, Uttar Pradesh, India* (AF-AFOSR-2138-71)

AF function - advanced aerospace vehicles and electro-magnetic materials. Deficiency - unreliability and failure of electronic components and devices under high operating temperatures and/or radiation fluxes. Research - characterize the electronic transport properties of metal oxides. How research contributes - metal oxides are now widely used as insulators and semi-conductors in Air Force electronic equipment, however, little is known about their properties and theoretically many more electronic applications are possible. They exhibit a variety of behaviors with metallic resistivities involving collective electron behavior at one end and semi-conduction involving temperature dependent carrier concentrations and/or the hopping mechanism at the other. This research will be directed toward understanding their behavior and determining new uses such as amplification, rectification, and switching devices.

Experimental measurements of magnetic susceptability, resistivity, DTA, Debye-Waller Factor, and Seebeck coefficient as a function of temperature and external pressure are fit to theoretical models to gain an understanding of transition mechanisms.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0007, STRUCTURE AND PROPERTIES OF PURE AND DOPED IONIC SOLIDS
E.C. SUBBARAO, Indian Inst. of Technology, *Kanpur, Uttar Pradesh, India* (AF-AFOSR-2136-71)

AF function - advanced aerospace vehicles. Deficiency - reliability and failure of electronic components and devices at high operating temperatures. Research - determine the relationship between the internal structure and the bulk properties of pure and doped ionic solids. How research contributes - the fluorite-structure oxides are pure ionic conductors with very high oxygen transport rates, and find wide use in various devices such as high temperature electrolytes in fuel cells for the generation of power or the regeneration of oxygen in life support systems. This research will be directed toward understanding their behavior and optimizing the compositions used. It will also determine their potential for high temperature amplification, rectification, and switching device applications.

High temperature charge and mass transport rates are measured and fit to theoretical models to develop an understanding of transport phenomena in ionic solids.

Supporting agency address information: Aerospace Research Laboratory LL, Wright-Patterson AFB, Ohio 45433

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0008, ANALYSIS OF OSO-7 DATA FOR NUCLEAR ACTIVATION OF NAI CSI
E.L. CHUPP, Univ. of New Hampshire, School of Liberal Arts, *Durham, New Hampshire* 03824 (NAS 5-20714)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0009, DESIGN STUDY FOR OSO-I WHEEL EXPERIMENT
R. NOVICK, Columbia University, School of Engineering, *New York, New York* 10027 (NAS 5-11292)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

8.0010, EXPERIMENTAL STUDY OF GASEOUS PLASMAS BY HIGH AMPLITUDE SHORT ELECTRIC FIELD IMPULSES
B.R. CHEO, New York University, School of Engineering, *New York, New York* 10453 (AF-AFOSR-2226-72)

Post-nuclear environment and re-entry simulations involve plasmas and intense electric fields. The capability to predict system operating parameters in these situations is essential to maintaining an adequate defense posture. Prediction of the plasma response on short time scales has not been subject to experimental measurement. This effort will provide research on plasma response to sub-nanosecond pulses and non- linear response characteristics under kilo-volt field strengths. The results will provide experimental data for evaluating the present predictions of Air Force systems capabilities under extreme environmental conditions and improve the design requirements for future systems. This research provides a new scientific capability to measure plasma properties under pico-second electric field impulses eliminating ionization and re-combination effects. Fields will be impressed both parallel and perpendicular to the existing

magnetic fields and response to both single and multiple pulses will be studied. Ion acoustic waves will be excited by short pulses and decay rates measured under conditions where the background plasma is minimal. Results will be used to determine the proper theoretical basis for predicting and controlling these effects.

Supporting agency address information: AF Office of Scientific Research NPP, 1400 Wilson Blvd., Arlington, Va. 22209

SUPPORTED BY U.S. Dept. of Defense - Air Force

8.0011, LABORATORY INVESTIGATION OF ATMOSPHERIC COLLISION PROCESSES
R.D. RUNDEL, Rice University, School of Engineering, *Houston, Texas* 77001

The subject continues to be laboratory investigations of atmospheric collision processes. The research is in an energy range (thermal to 10 ev) which is a very difficult energy range.

SUPPORTED BY U.S. Natl. Science Foundation

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, MICROPULSATION OBSERVATIONS AT SIPLE STATION
L.J. CAHILL, Univ. of Minnesota, School of Physics, *Minneapolis, Minnesota* 55455

Mu metal core search coil magnetometers will continue to collect digital data on magnetic tape at Siple Station, Roberval, Quebec and aboard S3 (Explorer 45). The data are being used to describe the state, location and dynamics of the plasmapause region of the magnetosphere during magnetic storms and to examine the relationship of micropulsations in the 10Hz to 10 to the minus 2nd power Hz frequency range to polar substorms. The high sampling rate (with resultant high resolution) and signal polarization measurements are used to study propagation characteristics. Time differences between signal arrival at conjugate points is used in conjunction with polarization measurements to deduce where and how signals originate and how the energy is dissipated. Simultaneous measurements at the conjugate points are analyzed to learn about the seasonal effect on micropulsation propagation and signals recorded at either ground station are compared with similar measurements made aboard Explorer 45 to examine the effect of propagation along the field line. Analysis techniques include the use of power spectra, dynamic power spectra and polarization holograms in data interpretation.

SUPPORTED BY U.S. Natl. Science Foundation

10.0002, STUDIES ASSOCIATED WITH LARGE SPACE TELESCOPE WORKING GROUP
L. SPITZER, Princeton University, Graduate School, *Princeton, New Jersey* 08540 (NAS 8-29390)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0003, INVESTIGATION OF THE GEOPHYSICAL IMPLICATIONS OF A TRANSPORTABLE LUNAR LASER
D.R. LAMMLEIN, Univ. of Texas, School of Medicine, *Galveston, Texas* 77550 (NSG 7074)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0004, LUNAR DATA SYNTHESIS
S.H. WARD, Univ. of Utah, School of Science, *Salt Lake City, Utah* 84112 (NSG 7090)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

10.0005, DYNAMICS OF PLANETARY ATMOSPHERES
C.B. LEOVY, Univ. of Washington, School of Arts, *Seattle, Washington* 98105 (NSG 7085)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

GENERAL

11.0001, REGIONAL DISSEMINATION CENTER OPERATION
D. WILDE, Univ. of Connecticut, School of Business Admin., *Storrs, Connecticut* 06268 (NASW 2516)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

11.0002, ECONOMIC ANALYSIS AND NASA TECHNOLOGY PROGRAM PLANNING
W.E. COBB, West Va. Coll. of Grad. Stud., Undergraduate School, *Institute, West Virginia* 25112 (NSG 7089)

SUPPORTED BY U.S. Natl. Aero. & Space Adm.

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Scientific and Technical Aerospace Reports

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01 AERONAUTICS (GENERAL)

N75-13790* + National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL ENGINEERING: A SPECIAL BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 49
Oct. 1974 111 p refs
(NASA-SP-7037(49)) Avail: NTIS HC $4.00 CSCL 05B

The bibliography contains 368 abstract citations of reports, journal articles, and other documents concerned with the engineering and theoretical aspects of design, construction, evaluation, testing, operation, and performance of aircraft (including aircraft engines) and associated components, equipment, and systems. Research and development in aerodynamics, aeronautics, and ground support equipment are also treated. Subject, personal author, and contract number indexes are included for ease of access. Author

N75-13791*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
HIGH ALTITUDE GUST ACCELERATION ENVIRONMENT AS EXPERIENCED BY A SUPERSONIC AIRPLANE
L. J. Ehernberger and Betty J. Love Washington Jan. 1975 26 p refs
(NASA-TN-D-7868; H-836) Avail: NTIS HC $3.75 CSCL 01A

High altitude turbulence experienced at supersonic speeds is described in terms of gust accelerations measured on the YF-12A airplane. The data were obtained during 90 flights at altitudes above 12.2 kilometers (40,000 feet). Subjective turbulence intensity ratings were obtained from air crew members. The air crew often rated given gust accelerations as being more intense during high altitude supersonic flight than during low altitude subsonic flight. The portion of flight distance in turbulence ranged from 6 percent to 8 percent at altitudes between 12.2 kilometers and 16.8 kilometers (40,000 feet and 55,000 feet) to less than 1 percent at altitudes above 18.3 kilometers (60,000 feet). The amount of turbulence varied with season, increasing by a factor of 3 or more from summer to winter. Given values of gust acceleration were less frequent, on the basis of distance traveled, for supersonic flight of the YF-12A airplane at altitudes above 12.2 kilometers (40,000 feet) than for subsonic flight of a jet passenger airplane at altitudes below 12.2 kilometers (40,000 feet). The median thickness of high altitude turbulence patches was less than 400 meters (1300 feet); the median length was less than 16 kilometers (10 miles). The distribution of the patch dimensions tended to be log normal. Author

N75-13792*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
WIND TUNNEL INVESTIGATION OF A TWIN ENGINE STRAIGHT WING UPPER SURFACE BLOWN JET FLAP CONFIGURATION
Arthur E. Phelps, III Washington Jan. 1975 80 p refs Prepared in cooperation with Army Air Mobility Research and Development Lab., Hampton, Va.
(NASA-TN-D-7778; L-9758) Avail: NTIS HC $4.75 CSCL 01A

An investigation was conducted in a full scale wind tunnel to determine the performance and aerodynamic characteristics of a twin engine, straight wing, upper surface blown jet flap configuration. The model had two simulated high bypass ratio turbofan engines with rectangular nozzles exhausting onto the upper surface of the wing at the 35 percent chord station. The model was tested with an aspect ratio 8.2 wing and with the wingtips removed to give an aspect ratio of 6.0. Author

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N75-13793 + Engineering Sciences Data Unit, London (England).
SUBSONIC LIFT-DEPENDENT DRAG DUE TO THE TRAILING VORTEX WAKE FOR WINGS WITHOUT CAMBER OR TWIST
Oct. 1974 10 p refs Supersedes ESDU-Aero-W.02.01.02 Sponsored by Roy. Aeron. Soc.
(ESDU-74035; ESDU-Aero-W.02.01.02) Copyright. Avail: NTIS HC $36.00

A numerical expression for the lift-dependent drag coefficient due to the wing trailing vortex wake at subsonic speeds is derived. The data apply to uncambered, untwisted wings with straight leading and trailing edges and streamwise tips. The theory from which the data were obtained is linearized and relates to inviscid flow. Additional mathematical relationships are developed for wings with different planforms. Graphs of the drag coefficient for various wing shapes and airspeed conditions are provided. Author

N75-13794 + Engineering Sciences Data Unit, London (England).
DRAG DUE TO A CIRCULAR CAVITY IN A PLATE WITH A TURBULENT BOUNDARY LAYER AT SUBSONIC, TRANSONIC AND SUPERSONIC SPEEDS
Nov. 1974 14 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-74036) Copyright. Avail: NTIS HC $74.50

Data on the drag due to a circular cavity in a plate immersed in a compressible turbulent boundary layer with zero heat transfer are provided. The data are applied to determining the drag penalty due to surface irregularities on aircraft components. The conditions under which the data are valid are: (1) circular cavities with sharp edges and flat bottoms, (2) depth to diameter ratios less than 1.5, (3) diameters up to about three times boundary-layer thickness, (4) turbulent boundary layers, (5) airflow with zero heat transfer, and Mach numbers less than 3.0. Author

N75-13795# Advisory Group for Aerospace Research and Development, Paris (France).
V/STOL AERODYNAMICS
Oct. 1974 355 p refs Partly in ENGLISH and partly in FRENCH Proc. of the Fluid Dyn. Panel Symp., Delft, Netherlands, 24-26 Apr. 1974
(AGARD-CP-143) Avail: NTIS HC $10.00

The proceedings of a conference on the design, development, and flight characteristics of V/STOL aircraft are presented. The subjects discussed include the following: (1) powered high lift systems, (2) mechanical high lift systems, (3) jet lift, (4) ground effect, and (5) aerodynamic prediction methods and simulation requirements. Examples of V/STOL aircraft configurations are illustrated. Specific performance parameters, actual and predicted, are analyzed in graph form. Numerical methods for determining aerodynamic characteristics from wind tunnel and flight tests are developed. For individual titles, see N75-13796 through N75-13821.

N75-13796* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
V/STOL AERODYNAMICS: A REVIEW OF THE TECHNOLOGY
David H. Hickey *In* AGARD V/STOL Aerodyn. Oct. 1974 13 p refs (For availability see N75-13795 05-02)
CSCL 01C

An analysis of the development and technological applications of V/STOL aircraft is presented. The use of V/STOL aircraft to overcome the limitations of conventional aircraft is discussed. The aspects of V/STOL aircraft which are considered are: (1) economic penalties of propulsive lift, (2) advantages of propulsive lift, (3) potential improvements in V/STOL aircraft, (4) the aerodynamics of V/STOL aircraft, and (5) proposals for additional research in V/STOL development. Author

N75-13797 De Havilland Aircraft Co., Ltd., Downsview (Ontario).
RESEARCH INTO POWERED HIGH LIFT SYSTEMS FOR AIRCRAFT WITH TURBOFAN PROPULSION c05
B. Eggleston *In* AGARD V/STOL Aerodyn. Oct. 1974 17 p refs (For availability see N75-13795 05-02)

The characteristics and applications of powered high lift systems suitable for turbofan powered aircraft are reviewed. Aerodynamic research conducted on high lift systems for use with high bypass ratio turbofan engines are reported. The systems discussed include: (1) mechanical flaps, (2) internally blown flaps, (3) externally blown flaps, and (4) vectored thrust. Tests on two-dimensional and three-dimensional models were conducted and the aerodynamic characteristics are applied to design studies of a turbofan powered short takeoff and landing transport aircraft. The application of computerized three-dimensional potential flow method to lift prediction for a wing with internally blown flaps is described. Author

N75-13798 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
PREDICTING THE MAXIMUM LIFT OF JET-FLAPPED WINGS
David J. Moorhouse *In* AGARD V/STOL Aerodyn. Oct. 1974 9 p refs (For availability see N75-13795 05-02)

A method for predicting the maximum lift of jet flap configurations is presented. The three parts of the process are described. A theoretical expression for the increment in maximum lift due to blowing on jet-flapped airfoils was obtained that was based on the assumption of a leading-edge stall. For practical application a three-dimensional theory is required, with suitable corrections for finite aspect ratio and part span flaps. The expression shows agreement with measured results for pure jet flaps, internally blown flaps, externally blown flaps, and upper surface blown flaps. It was determined that the results are independent of the actual presence of a leading edge stall, independent of the sweep angle, and applicable to aspect ratios greater than approximately three. Author

N75-13799 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
WIND TUNNEL INVESTIGATION OF THREE POWERED LIFT STOL CONCEPTS c05
R. F. Osborn and G. S. Oates *In* AGARD V/STOL Aerodyn. Nov. 1974 12 p refs (For availability see N75-13795 05-02)

A comprehensive, parametric wind tunnel investigation of three short takeoff and landing aircraft concepts was conducted. The three STOL configurations were: (1) the externally blown flap (EBF), (2) internally blown flaps (IBF), and (3) the mechanical flap/vectored thrust (MF/VT). Wind tunnel model characteristics are shown as well as the details of the high lift devices tested. The effect of engine location is discussed and is shown to be the dominant factor in EBF and MF/VT powered lift performance. Wing sweep and aspect ratio effects on lifting performance are analyzed. Performance in ground effect is covered using the test data collected. Incremental changes in the lift, drag, and pitching moment characteristics resulting from in-ground effect operation are explained. A comparison of the aerodynamic performance of the three powered lift systems is included. Author

N75-13800 National Aeronautical Establishment, Ottawa (Ontario). Low Speed Aerodynamics Lab.
THE SPANWISE LIFT DISTRIBUTION AND TRAILING VORTEX WAKE DOWNWIND OF AN EXTERNALLY BLOWN JET FLAP
R. H. Wickens *In* AGARD V/STOL Aerodyn. Oct. 1974 23 p refs (For availability see N75-13795 05-02)

The aerodynamic characteristics of externally blown flaps (EBF) are presented for configurations of the quasi-two dimensional and reflection-plane type. Force and surface pressure measurements have shown that significant lift increments can be realized by external blowing, and that the spanwise effect of this increase extends outward from the nacelle location. The effective stream tube dimension of the additional lift can be a significant fraction of the wing span. Downstream flow surveys have shown that the presence of mixed regions of propulsive and vortex flows is typical of the EBF, particularly for multi-engined finite wing configurations. The characteristics of wake measurements downwind of a half-model of a multi-engine aircraft of the EBF type are described. Author

N75-13801 Royal Aircraft Establishment, Bedford (England).
THE FLOW AROUND A WING WITH AN EXTERNAL FLOW JET FLAP
P. R. Ashill and D. N. Foster *In* AGARD V/STOL Aerodyn. Oct. 1974 13 p refs (For availability see N75-13795 05-02)

The main features of the flow around a wing with an externally blown jet flap are discussed. Measurements were made, under wind-on and wind-off conditions, on a half model of a wing-fuselage with an injector powered nacelle mounted under the wing. Analysis of the velocity distributions measured in the jet at the trailing edge of the flap suggests that the turning and spreading process is sensibly independent of forward speed. The sweepback effect on the spanwise distribution of momentum towards the wing tip is investigated. It was determined that the spanwise distributions of lift and pressure drag, derived from static pressure measurements made under wind-on conditions, exhibit a pronounced nonuniformity in the vicinity of the nacelle. It is stated that the jet flap effect on the total lift is small. Author

N75-13802 Canadair, Ltd., Montreal (Quebec).
INVESTIGATION OF EXTERNALLY BLOWN FLAP AIRFOILS WITH LEADING EDGE DEVICES AND SLOTTED FLAPS
Fotis Mavriplis and David Gilmore *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

An investigation was conducted to provide information on the aerodynamics of externally blown flap systems and to establish the correspondence of such systems, in which the flap is blown by a jet of circular cross section, with two dimensional jet flaps. Wind tunnel tests were conducted with a two dimensional high lift wing model and a tip turbine fan having a diameter-to-wing chord ratio of 0.365. A semi-empirical two dimensional method is also presented which is an extension of the theory for thin multi-element airfoils and a nonlinear jet geometry. The measured data provided useful empirical relationships for estimating the two dimensional C sub L max and C sub D. Author

N75-13803 Societe Bertin et Cie, Plaisir (France).
PRESENTATION OF AERODYNAMIC AND ACOUSTIC RESULTS OF QUALIFICATION TESTS ON THE ALADIN 2

CONCEPT [PRESENTATION DES RESULTATS AERODYNAMIQUES ET ACOUSTIQUES DES ESSAIS DE QUALIFICATION OU CONCEPT ALADIN 2] c05

Maurice Collard, Claude Doyotte, and Max Sagner *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs In FRENCH (For availability see N75-13795 05-02)

Wind tunnel tests were conducted of a scale model of the Aladin 2 aircraft. The propulsion system configuration is described and the air flow caused by jet ejection is analyzed. Three dimensional flow studies in the vicinity of the engine installation were made. Diagrams of the leading and trailing edge flaps are provided. Graphs are developed to show the aerodynamic performance under conditions of various airspeed and flap deflection. Author

N75-13804 Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

THEORETICAL AND EXPERIMENTAL STUDY OF BOUNDARY LAYER CONTROL BY BLOWING AT THE KNEE OF A FLAP

Bernard Monnerie and Guy Lovat *In* AGARD V/STOL Aerodyn. Oct. 1974 20 p refs In FRENCH; ENGLISH summary (For availability see N75-13795 05-02)

An investigation of lift augmentation by boundary layer blowing was conducted. The test equipment consisted of a large scale mounting for the study of two dimensional boundary layers. The tests were conducted in a low speed wind tunnel three meters in diameter. The experimental results obtained by probing the jet-boundary layer mixing zone are presented. The results are compared with computations using a turbulence model based on the Nee-Kovasznay equation for the viscosity coefficient. Author

N75-13805* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AERODYNAMICS OF JET FLAP AND ROTATING CYLINDER FLAP STOL CONCEPTS

Woodrow L. Cook, David H. Hickey, and Hervey C. Quigley *In* AGARD V/STOL Aerodyn. Oct. 1974 6 p refs (For availability see N75-13795 05-02)

CSCL 01C

The aerodynamic effectiveness of various propulsive lift concepts to provide for the low speed performance and control required for short takeoff and landing aircraft is discussed. The importance of the interrelationship between the propulsion system and aerodynamic components of the aircraft is stressed. The relative effectiveness of different lift concepts was evaluated through static and wind tunnel tests of various aerodynamic models and propulsion components, simulations of aircraft, and in some cases, flight testing of research aircraft incorporating the concepts under study. Results of large scale tests of lift augmentation devices are presented. The results of flight tests of STOL research aircraft with augmented jet flaps and rotating cylinder flaps are presented to show the steeper approach flight paths at low forward speeds. Author

N75-13806 Avions Marcel Dassault-Breguet Aviation, Saint-Cloud (France).

PROGRESS REPORT ON MECHANICAL FLAPS

P. Perrier and M. Lavenant *In* AGARD V/STOL Aerodyn. Oct. 1974 15 p refs In FRENCH; ENGLISH summary (For availability see N75-13795 05-02)

The development of wing lift augmentation for short takeoff aircraft is discussed. The problems associated with powered lift created interest in designing mechanical high lift devices capable of lift coefficient greater than 4. To obtain such a coefficient, computerized techniques were used. A wing with powerful mechanical high lift devices was designed with a combined use of theoretical aerodynamic methods and experience gained in developing the advanced mechanical systems. Comparisons between estimated and test results are provided. Author

N75-13807 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).

A METHOD FOR PREDICTION OF LIFT FOR MULTI-ELEMENT AIRFOIL SYSTEMS WITH SEPARATION

K. Jacob and D. Steinbach *In* AGARD V/STOL Aerodyn. Oct. 1974 16 p refs (For availability see N75-13795 05-02)

A numerical procedure is presented for analyzing the performance of high lift devices such as leading edge slats and slotted flaps. The method also makes it possible to predict pressure distributions and lift for many arbitrary airfoil combinations in incompressible flow. The method considers the boundary layer displacement effect and allows for rear separation with a dead air region. The maximum lift can be predicted on the basis of the geometry of the system and the Reynolds number of the flow. The method has been programmed in FORTRAN for the IBM 360-65 computer and has been applied to several airfoil combinations. Diagrams of the flow characteristics of the airfoils under varying conditions are provided. The mathematical models which support the theoretical aspects are developed. Author

N75-13808 Aeronautical Research Inst. of Sweden, Stockholm.

EXPERIMENTAL HIGH LIFT OPTIMIZATION OF MULTIPLE ELEMENT AIRFOILS

Bjoern L. G. Ljungstroem *In* AGARD V/STOL Aerodyn. Oct. 1974 16 p refs (For availability see N75-13795 05-02)

The application of two dimensional testing and two dimensional wind tunnel techniques for experimental high lift investigations is discussed. The tests conducted on geometrical variations of double and triple slotted mechanical flaps are described. It is shown that an optimum slat position corresponds to a flow with relatively little interaction between the slat wake and the main wing and flap boundary layers. Similar results were also obtained for the trailing edge, where it is found that the different viscous layers should be kept essentially separated from each other. The interrelationship between the flow over the leading-edge slats and that over the trailing-edge flaps is analyzed. The calculation methods consist of a potential flow method and a method in which the boundary layer effects are considered. Author

N75-13809 British Columbia Univ., Vancouver.

THE AERODYNAMICS OF TWO-DIMENSIONAL AIRFOILS WITH SPOILERS

G. V. Parkinson, G. P. Brown, and T. Jandali *In* AGARD V/STOL Aerodyn. Oct. 1974 10 p refs Sponsored by Defence Res. Board of Canada (For availability see N75-13795 05-02)

The development of three incompressible potential flow methods for two dimensional airfoils with upper surface spoilers is discussed. A linearized free stream theory is used to predict the steady and transient lift on thin, single-element airfoils of arbitrary incidence, camber, and thickness, with spoilers of arbitrary position, height, and inclination. Theories for determining the pressure distribution on thick airfoils are reported. Wind tunnel measurements of steady and transient lift and pressure distribution have been made using two different airfoil profiles with several different spoiler sizes, positions, and inclinations. Author

N75-13810 Politecnico di Milano (Italy). Instituto di Ingegneria Aerospaziale.

THE EFFECT OF VORTEX GENERATORS ON THE DEVELOPMENT OF A BOUNDARY LAYER

Sergio DePonte and Arturo Baron *In* AGARD V/STOL Aerodyn. Oct. 1974 5 p refs (For availability see N75-13795 05-02)

The development of computer techniques for predicting the aerodynamic characteristics of an airfoil in the presence of vortex generators is discussed. An experimental program to investigate the turbulent structure of the vortex was conducted. It was determined that the vorticity profiles are very similar to those characterizing the viscous case, although the vortex was turbulent. A model of vortex-boundary layer interaction was constructed. The model is the basis of many conclusions about the application of vortex generators as a means of boundary layer control. Author

N75-13811 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).

JET LIFT PROBLEMS OF V/STOL AIRCRAFT c05

J. Barche *In* AGARD V/STOL Aerodyn. Oct. 1974 18 p refs (For availability see N75-13795 05-02)

The effect of jet lift interference on the design of jet-supported V/STOL aircraft is discussed. The basic flow problems which are assumed to be valid for all types of V/STOL aircraft are analyzed. The operational aspects of military V/STOL aircraft are examined. The specific problems of V/STOL operation involving

transition flight, pitch control and stability, lateral /direction, control and stability, hovering flight, and recirculation of the jet exhaust are presented. Author

N75-13812 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
SIDESLIP IN VTOL-TRANSITION FLIGHT: A CRITICAL FLIGHT CONDITION AND ITS PREDICTION IN SIMPLE WIND TUNNEL TESTS
B. Ewald *In* AGARD V/STOL Aerodyn. Oct. 1974 13 p refs (For availability see N75-13795 05-02)

Wind tunnel tests were conducted to analyze the performance of the VAK 191 B VTOL aircraft during transition flight. The procedures for conducting the wind tunnel tests are explained. It was determined that the ratio of jet momentum and free stream momentum is the most important scaling parameter for the influence of the jet on the external flow field. The results of the wind tunnel tests are compared with flight test results to deteremine the extent of agreement. Based on the wind tunnel tests, development of the aircraft automatic altitude control system and a system for pilot training in the flight simulator was completed. Author

N75-13813 National Aerospace Lab., Amsterdam (Netherlands).
A METHOD FOR THE CALCULATION OF THE FLOW FIELD INDUCED BY A JET EXHAUSTING PERPENDICULARLY INTO A CROSS FLOW
H. Snel *In* AGARD V/STOL Aerodyn. Oct. 1974 16 p refs (For availability see N75-13795 05-02)

A description is given of a method for the calculation of the potential flow field arising from the interaction of a turbulent jet with a uniform free stream. The method is applied to the case of a jet moving perpendicularly into a cross flow. The model assumes the jet to entrain free stream mass together with its free stream momentum. The decay of axial velocity in the jet is used as empirical input. The geometry of the jet surface and jet entrainment follow from the model. A set of quadratic equations, describing mass and momentum transfer from the exterior flow to the jet, consistent with equations used for the jet model, yields the normal velocity distributions and the source strengths of the surface panels. Author

N75-13814 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Prototype Div.
DESIGN AND TEST OF EJECTOR THRUST AUGMENTATION CONFIGURATIONS c07
S. L. Brown and R. D. Murphy *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

The application of hypermixing primary injection nozzle devices for operational vertical takeoff aircraft is discussed. Preliminary design studies have been directed toward subsonic and supersonic VTOL close air support fighters. In addition to demonstrating the feasibility of the ejector thrust augmentation (EVA), special problems in the areas of engine cycle characteristics, internal aerodynamics, and external dynamics were investigated. Two-dimensional wind tunnel tests were conducted to analyze the external aerodynamic problem areas. One test investigates the vertical flight mode and the other test investigates the transition flight mode. Author

N75-13815 Ruhr Univ., Bochum (West Germany).
GROUND EFFECT ON AIRFOILS WITH FLAPS OR JET FLAPS
K. Gersten, R. Loehr, and E. Beese *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

The two-dimensional incompressible flow past airfoils with flaps or jet flaps near the ground is investigated. The inviscid flow is calculated by potential theory methods. It is shown that the nonlinear effects due to large angles of attack and flap angles become increasingly important as airfoils approach the ground. For airfoils with jet flaps, wind tunnel tests, including ground simulation, have been carried out. The theoretical results are compared with experiments and with linear theory. Author

N75-13816* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MEASUREMENT OF TILT ROTOR VTOL ROTOR WAKE-AIRFRAME GROUND AERODYNAMIC INTERFERENCE FOR APPLICATION TO REAL TIME FLIGHT SIMULATION c05
Troy M. Gaffey (Bell Helicopter Co., Ft. Worth, Tex.) and Martin D. Maisel *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)
CSCL 01C

The hover and low speed rotor wake-airframe-ground aerodynamic characteristics of the XV-15 tilt rotor research aircraft were determined in wind tunnel tests of a scale model. Results of the wind tunnel tests were applied to real flight time simulation. The principal findings of the wind tunnel tests are summarized. The effect of aerodynamic interference on the handling qualities of the aircraft is analyzed. It was determined that aerodynamic interference effects are significant in hover and at low speeds, with the influence being more pronounced in ground effect than out of it. At airspeeds above 60 knots, aerodynamic interference does not have a significant effect on handling characteristics. Author

N75-13817 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Flight Control Div.
US AIR FORCE V/STOL AIRCRAFT AERODYNAMIC PREDICTION METHODS c05
Henry W. Woolard *In* AGARD V/STOL Aerodyn. Oct. 1974 14 p refs (For availability see N75-13795 05-02)

Analytical methods for the prediction of the aerodynamic characteristics of V/STOL aircraft are reviewed. The aerodynamic characteristics of short takeoff aircraft are discussed with emphasis on high lift systems using internally-blown flaps, under-the-wing externally-blown flaps, and mechanical flaps combined with thrust vectoring. The power-induced aerodynamics of lift-jet, lift-fan, and vectored-thrust V/STOL aircraft operating in hover and transition flight regimes are examined. Emphasis is placed on describing selected methods that employ rational analytical modeling of the real aerodynamics in conjunction with empirical modifications as required. Author

N75-13818 Dornier-System G.m.b.H., Friedrichshafen (West Germany).
PREDICTION OF AERODYNAMIC INTERFERENCE EFFECTS WITH JET-LIFT AND FAN-LIFT VTOL AIRCRAFT
Dieter Welte *In* AGARD V/STOL Aerodyn. Oct. 1974 9 p refs (For availability see N75-13795 05-02)

A guide-line for a rough estimation of the jet induced lift losses of VTOL aircraft configurations with jet-lift and fan-lift engines hovering in and out of ground effect is presented. The nature and magnitude of the aerodynamic jet interference effects is found empirically by dimensional analysis of the flow field and by measurements. Jet induced lift losses and pitching moments with forward speeds are discussed on the basis of wind tunnel measurements. Author

N75-13819 British Aircraft Corp., London (England). Military Aircraft Div.
A REVIEW OF THE LIFTING CHARACTERISTICS OF SOME JET LIFT V/STOL CONFIGURATIONS c05
P. G. Knott and J. J. Hargreaves *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

Changes to the wing lift that occur as a result of the interaction between the lifting jet efflux and the free stream are discussed. Attempts to develop empirical models for predicting the aerodynamic characteristics are described. Data correlation attempts are discussed with respect to a curve fitting exercise using data from tests on a finite wing with jet size and position as variables, and a method which approximates the lift to thrust coefficient relationship linearly. It is stated that the location of the lift jets is one of the most fundamental parameters and test results are presented to show some of the lift trends. Results from tests conducted in ground effect in both hover and forward speed are discussed. Author

N75-13820* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REQUIREMENT FOR SIMULATION IN V/STOL RESEARCH AIRCRAFT PROGRAMS c05
Hervey C. Quigley and Curt A. Holzhauser *In* AGARD V/STOL Aerodyn. Oct. 1974 11 p refs (For availability see N75-13795 05-02)
CSCL 01C

The application of flight simulation to aircraft design and development is discussed. The general stages of aircraft development are defined. The application of flight simulation to the following projects is reported: (1) the development and flight research of the Augmented Jet-Flap STOL research aircraft and (2) design studies of advanced VTOL research aircraft. It is stated that the simulation projects proved significant in helping establish criteria for the aircraft design and in facilitating the study of problems associated with new flight profiles, new methods of control, and special emergency conditions. Author

N75-13821 Kingston Polytechnic, Kingston-Upon-Thames (England).
A LITERATURE SURVEY ON JETS IN CROSSFLOW c34
E. C. P. Ransom and P. M. Wood *In* AGARD V/STOL Aerodyn. Oct. 1974 7 p refs (For availability see N75-13795 05-02)

The important features of a literature survey on the interference effects of jets in cross flow are outlined. The catalog lists the reports reviewed and contains a tabulation of data in terms of the independent variables, dependent variables, and test techniques. The experimental work is considered with respect to the following: (1) the fluid and geometrical properties of the jet and cross flow and (2) the geometrical arrangement of the aerodynamic elements. Author

N75-13822*# Chrysler Corp., New Orleans, La. Space Div.
SUBSONIC AND TRANSONIC HINGE MOMENT AND WING BENDING/TORSION CHARACTERISTICS OF .015 SCALE SPACE SHUTTLE MODELS 49-0 AND 67-TS IN THE ROCKWELL INTERNATIONAL TRISONIC WIND TUNNEL (IA70), VOLUME 1
M. T. Hughes (Rockwell Intern., Los Angeles) and R. C. Mennell (Rockwell Intern., Los Angeles) Nov. 1974 732 p 3 Vol. (Contract NAS9-13247)
(NASA-CR-134431; DMS-DR-2175-Vol-1) Avail: NTIS HC $17.25

Experimental aerodynamic investigations were conducted on an 0.015-scale representation of the integrated space shuttle launch vehicle in the trisonic wind tunnel. The primary test objective was to obtain subsonic and transonic elevon and bodyflap hinge moments and wing bending-torsion moments in the presence of the launch vehicle. Wing pressures were also recorded for the upper and lower right wing surfaces at two spanwise stations. The hinge moment, wing bending/torsion moments and wing pressure data were recorded over an angle-of-attack (alpha) range from -8 deg to +8 deg, and angle-of-sideslip (beta) range from -8 deg to +8 deg and at Mach numbers of 0.90, 1.12, 1.24 and 1.50. Tests were also conducted to determine the effects of the orbiter rear attach cross beam and the forward attach wedge and strut diameter. The orbiter alone was tested at 0.90 and 1.24 Mach number only. Author

N75-13823*# Chrysler Corp., New Orleans, La. Space Div.
SUBSONIC AND TRANSONIC HINGE MOMENT AND WING BENDING/TORSION CHARACTERISTICS OF .015 SCALE SPACE SHUTTLE MODELS 49-0 AND 67-TS IN THE ROCKWELL INTERNATIONAL TRISONIC WIND TUNNEL (IA70), VOLUME 2
M. T. Hughes (Rockwell Intern., Los Angeles) and R. C. Mennell (Rockwell Intern., Los Angeles) Nov. 1974 809 p 3 Vol. (Contract NAS9-13247)
(NASA-CR-134432; DMS-DR-2175-Vol-2) Avail: NTIS HC $19.25
For abstract, see N75-13822.

N75-13824*# Chrysler Corp., New Orleans, La. Space Div.
SUBSONIC AND TRANSONIC HINGE MOMENT AND WING BENDING/TORSION CHARACTERISTICS OF .015 SCALE SPACE SHUTTLE MODELS 49-0 AND 67-TS IN THE ROCKWELL INTERNATIONAL TRISONIC WIND TUNNEL (IA70), VOLUME 3
M. T. Hughes (Rockwell Intern., Los Angeles) and R. C. Mennell (Rockwell Intern., Los Angeles) Nov. 1974 1095 p 3 Vol. (Contract NAS9-13247)
(NASA-CR-134433; DMS-DR-2175-Vol-3) Avail: NTIS HC $25.25
For abstract, see N75-13822.

N75-13825*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL INVESTIGATION OF A SIMPLE DISTORTION INDEX UTILIZING STEADY-STATE AND DYNAMIC DISTORTIONS IN A MACH 2.5 MIXED-COMPRESSION INLET AND TURBOFAN ENGINE
William G. Costakis Washington Jan. 1975 22 p refs (NASA-TM-X-3169; E-8061) Avail: NTIS HC $3.25 CSCL 01A

A wind tunnel investigation was conducted to determine the amplitude and spatial distribution of steady-state and dynamic distortion produced in an inlet with 45 percent of the overall supersonic area contraction occurring internally. It was found that the inlet support strut location and/or the overboard bypass flow rate has a significant effect on the spatial distribution of distortion. Because of this effect the majority of the stall points exhibited four-per-revolution patterns of distortion. Data from this test were used to formulate a simple index that combines steady-state and dynamic distortions. Distortion results obtained with this index correlated well with exhaust nozzle area. It is shown that the exhaust nozzle area of a TF30-P-3, as modified for use in this test, can be controlled in a scheme to avoid engine stall. A considerable increase in engine distortion tolerance can be achieved by opening the 7th-stage bleed. The engine exhibited higher tolerance to distortion for multiple patterns of distortion per-revolution than for a one-per-revolution pattern of distortion. Author

N75-13826# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
AIRSHIPS
Jun. 1974 252 p Partly in GERMAN; partly in ENGLISH; ENGLISH summary Proc. of 2nd DGLR Colloq., Muehlheim, West Ger., 21-22 Mar. 1973
(DLR-Mitt-74-12) Avail: NTIS HC $8.50; ZLDI, Munich 52,30 DM

Economic factors of airship transportation were discussed to a large extent. A study related to the inventory of existing proposals for airship projects is reported, together with the evaluations of economic and technical feasibility. The application of an airship to the transportation of indivisible loads is discussed. A design for an airship carry 890 passengers and 200 tons of cargo is described. The use of nuclear propulsion for airships was examined. A novel concept of drag reduction for airships by wave incidence control is described. For individual titles, see N75-13827 through N75-13831.

N75-13827 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
PREREQUISITES FOR THE DEFINITION OF AN AIRSHIP PROJECT [VORAUSSETZUNGEN FUER DIE DEFINIERUNG EINES LUFTSCHIFFPROJEKTES] c03
W. VonKirschbaum *In its* Airships Jun. 1974 p 13-63 In GERMAN (For availability see N75-13826 05-02)

A study was carried out related to the inventory of existing proposals for airship projects, evaluations of technical and economic feasibility, and requirements for airship traffic. An estimation provides useful indications for future work. It is pointed out that only an overall system will provide a basis for revival of large volume airship traffic. ESRO

N75-13828 Surrey Univ., London (England). Dept. of Mechanical Engineering.
THE AIRFLOAT TRANSPORT SYSTEM c03
E. Mowforth *In* DGLR Airships Jun. 1974 p 65-93 (For availability see N75-13826 05-02)

A transport system, based on the use of a large airship designed to carry 400 tons over a maximum still-air stage of 1000 km when cruising at 170 km/h at an altitude of 1000 m, is described. The system is intended primarily for the movement of large indivisible loads over moderate distances between unprepared sites, but other applications have also been considered using nodules. ESRO

N75-13829 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
DESCRIPTION OF AN AIRSHIP DESIGN: LIMITS FOR SPEED, SIZE, ADAPTABILITY [BESCHREIBUNG EINES

LUFTSCHIFF-ENTWURFS. GRENZEN FUER GESCHWINDIGKEIT, GROESSE, EINSATZFAEHIGKEIT] c05
H. Toennes *In its* Airships Jun. 1974 p 95-105 In GERMAN (For availability see N75-13826 05-02)

A design is described for an airship carrying 890 passengers and 200 tons of cargo for transatlantic crossings at a flight altitude of 1200 to 1400 m. The cruising speed is 160 km/h, and maximum speed 200 km/h. ESRO

N75-13830 Luftschifftechnik ALV, Graz (Austria).
THE NUCLEAR AIRSHIP ALV-C/1 [DAS ATOMLUFTSCHIFF ALV-C/1] c07
Erich VonVeress *In* DGLR Airships Jun. 1974 p 107-131 In GERMAN (For availability see N75-13826 05-02)

The design of an airship propelled by helium closed cycle gas turbines in combination with a high temperature nuclear reactor is discussed. ESRO

N75-13831 Deutsche Studiengemeinschaft fuer Luftschiffahrt, Frankfurt am Main (West Germany).
FLIGHT IN UNDULATED FLOW: AIRSHIPS WITH NON-POLLUTING PROPULSION SYSTEMS [DER FLUG IN GEWELLTER STROEMUNG. LUFTSCHIFFE MIT UMWELTFREUNDLICHEM ANTRIEBSSYSTEM] c07
E. Krueger and W. Happel *In* DGLR Airships Jun. 1974 p 133-137 In GERMAN (For availability see N75-13826 05-02)

The principle of drag reduction, based on the undulating motion of fish and simulated by alternate wave incidence, was applied to the design of an airship, which, in addition, is propelled by nonpolluting engines. The propulsion system consists of a cold jet engine drawing its energy from a steam turbine. The airship fuselage resembles the center part of an airfoil. A model test was carried out, and some results are presented. ESRO

N75-13832# Aerospace Research Labs., Wright-Patterson AFB, Ohio.
STABILITY DERIVATIVES OF A 10 DEGREE CONE EXECUTING PLANAR AND NONPLANAR MOTION AT MACH 14 Interim Report, Jun. 1973 - Jun. 1974
Kevin E. Yelmgren, Frank M. Sawyer, and Otto Walchner Aug. 1974 46 p refs
(AF Proj. 7064)
(AD-786458; ARL-TR-74-0112) Avail: NTIS CSCL 16/2

A 10 degree half angle circular cone with 1.6% nose bluntness was mounted to the sting-strut support system of ARL's 20-inch Mach 14 wind tunnel by means of a two-degree of freedom flexure. The small amplitude (approximately 3 deg.) free oscillation technique allowed the investigation of planar motion in pitch, or planar motion in yaw, or nonplanar motion in pitch and yaw combined. In the case of planar motion, the logarithmic amplitude decayed linearly with time. In the case of nonplanar motion, however, the amplitude decay of both the pitch and yaw components was modulated. (Modified author abstract) GRA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N75-13833# Committee on Science and Astronautics (U. S. House).
AVIATION SAFETY
Washington GPO 1974 250 p refs Hearing before Subcomm. on Aeron. and Space Technol. of Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., No. 47, 31 Jul. 1974
(GPO-41-958) Avail: Subcomm. on Aeron. and Space Technol.

A Congressional hearing was conducted to examine the aviation safety programs conducted by the U.S. Air Force, the U.S. Navy, the National Transportation Safety Board, the Federal Aviation Administration, and NASA. The investigation consisted primarily of testimony from representatives of the organizations and questions from the members of Congress. The various means which the organizations have taken to reduce accidents are discussed. The interchange of information between the organization to provide more effective use of the research efforts was recommended. Author

N75-13834# National Aviation Facilities Experimental Center, Atlantic City, N.J.
TECHNICAL EVALUATION OF WEATHER CLUTTER FEASIBILITY MODEL Final Report, Jun. 1970 - Jun. 1974
Ronald S. Bassford Sep. 1974 70 p refs
(AD-787607; FAA-RD-74-137; FAA-NA-74-25) Avail: NTIS HC $4.25

An ASR-5 weather clutter feasibility model was developed and evaluated to determine its capability to provide air traffic controllers with a weather display (clutter free) of air traffic and a contour depiction of weather detected by radar. The technical tests included the determination of technical characteristics of each of four modifications (narrow transmitter pulse width, noncoherent moving target indicator, dual frequency diversity, and logarithmic/fast time constant), which comprised the weather rejection portion of the system, along with their capabilities to provide clutter rejection and target detection in weather. The four modifications were tested in unison to determine the system's overall capability. The weather channel portion of the equipment was tested to determine its capability to provide weather clutter formatting in the form of isoamplitude contours. The results demonstrated that the weather clutter feasibility model does not effectively perform the designed functions of weather clutter rejection and weather clutter contouring. Author

N75-13835# Technische Universitaet, Brunswick (West Germany). Sonderforschungsbereich 58 Flugfuehrung.
ALL-WEATHER SHORT RANGE FLIGHT OF CIVIL TRANSPORT AIRCRAFT Annual Report, 1974 [ALLWETTERFLUG ZIVILER TRANSPORTFLUGZEUGE IM NAHBEREICH, FORSCHUNGSBERICHT 1974]
1974 268 p refs In GERMAN
Avail: NTIS HC $8.50

An annual civil aviation research report, 1974 edition, is presented. Research groups reporting are aircraft path and attitude control, navigation and safety systems, and instrumentation and anthropotechnology. ESRO

N75-13827 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
PREREQUISITES FOR THE DEFINITION OF AN AIRSHIP PROJECT [VORAUSSETZUNGEN FUER DIE DEFINIERUNG EINES LUFTSCHIFFPROJEKTES]
W. VonKirschbaum *In its* Airships Jun. 1974 p 13-63 In GERMAN (For availability see N75-13826 05-02)

N75-13828 Surrey Univ., London (England). Dept. of Mechanical Engineering.
THE AIRFLOAT TRANSPORT SYSTEM
E. Mowforth *In* DGLR Airships Jun. 1974 p 65-93 (For availability see N75-13826 05-02)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *Communications.*

N75-13836# National Aviation Facilities Experimental Center, Atlantic City, N.J.
TEST OF GLIDE SLOPE GUIDANCE WITH AND WITHOUT SIMPLIFIED ABBREVIATED VISUAL APPROACH SLOPE INDICATOR Interim Report, Jul. - Dec. 1973
Guy S. Brown and Richard L. Sulzer Oct. 1974 31 p refs
(AD-787304; FAA-RD-74-139; FAA-NA-74-22) Avail: NTIS HC$3.75

In a flight test at a small airport, rectangular aiming-point markings with and without the additional use of a low-cost version of the red/white simplified abbreviated visual approach slope indicator (SAVASI) served as daytime approach guidance aids. Results showed that approaches made with the SAVASI were less variable in measured approach slope, and approaches made in the last half-mile before landing were nearer the 4 deg SAVASI glidepath angle. On average, approaches made either with or without the SAVASI were steeper than 4 deg, and tracking of itinerant aircraft not informed of the testing confirmed that the usual approach for small aircraft at this runway was in the 5 deg, to 6 deg range. This indicates that future installations of SAVASI or related guidance aids should be made after measuring the normal practice at a given airport. Test pilot opinion was that the SAVASI was easy to use and provided good guidance in the vertical plane and that the rectangular aiming-point markings were beneficial. Author

N75-13837# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management.

ENGINEERING AND DEVELOPMENT PROGRAM PLAN: AREA NAVIGATION

D. Michael Brandewie and Ricardo Cassell Sep. 1974 44 p refs

(AD-787452; FAA-ED-04-02) Avail: NTIS HC $3.25

This program development plan provides the research and development necessary to support the evaluation of the concepts and provide answers to critical issues affecting the implementation of area navigation as described in the report of the Joint FAA/Industry Area Navigation Task Force, Application of Area Navigation in the National Airspace System. The program objectives, background, interfaces, technical approach, resource requirements and schedules are detailed in the plan. The program is responsive to the R&D requested efforts outlined in the Task Force Report. The work efforts are divided into five interdependent product activities: RNAV Payoff Analysis, RNAV Terminal Design, RNAV En Route Design, RNAV Avionics and Supporting Studies. Author

N75-13838*# Ohio Univ., Athens. Dept. of Electrical Engineering.

FLIGHT EVALUATION: OHIO UNIVERSITY OMEGA RECEIVER BASE

Kent A. Chamberlin, Robert W. Lilley, and Richard J. Salter Nov. 1974 33 p refs

(Grant NGR-36-009-017)

(NASA-CR-141058; TM-13) Avail: NTIS HC $3.75 CSCL 17G

A flight evaluation is presented of the Ohio University Omega Receiver Base, developed under the NASA Tri-University Program in Air Transportation, to provide a vehicle for the transfer of flight-test data to NASA and to other participants in the Tri-University program. Chart recordings of flight data are given, along with chronological listings of significant events which occurred during the flight. Digital data was prepared in data-processing card form for distribution. Data include phase measurements from all eight Omega time-slots for the duration of the flight, plus event marks which serve to correlate the phase data with flight-path documentation. Author

N75-13839# National Aviation Facilities Experimental Center, Atlantic City, N.J. Systems Research and Development Service.

MODELING AIR TRAFFIC PERFORMANCE MEASURES. VOLUME 1: MESSAGE ELEMENT ANALYSES AND DICTIONARIES Interim Report, Jul. 1972 - Aug. 1973

J. S. Hunter, D. E. Blumenfeld, and D-A. Hsu Jul. 1974 320 p Prepared by Princeton Univ.

(Contract DOT-FA72NA-741)

(AD-782437; FAA-RD-73-147-Vol-1) Avail: NTIS HC $7.50

Voice communications between aircraft and controller were analyzed in order to describe the overall patterns of these transactions. In particular, the distributions of message element frequencies and transmission times were examined. Comparisons between ground-initiated and pilot-initiated transmissions show little differences in the distributions. There are considerable differences when the data are broken down into messages made during first, last, and other communication transactions. Distributions of operational characteristics (i.e. request, acknowledgment, etc.) also differ between ground- and pilot-initiated transmissions. Detailed dictionaries of the different message combinations appearing as transmissions are presented. Author

N75-13840# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).

CLUTTER-ADAPTIVE SYSTEM FOR TARGET ACQUISITION FOR SURVEILLANCE RADAR DEVICES [EIN STOERADAPTIVES SYSTEM ZUR ZIELENTDECKUNG BEI RUNDSUCH-RADARGERAETEN]

W. Buehring Feb. 1974 81 p refs In GERMAN; ENGLISH summary

(Rept-217) Avail: NTIS HC $4.75

A system with a self adapting pre-whitening filter followed by a Doppler filter bank was investigated to improve sensitivity to target return in cluttered surveillance radar systems for air traffic control. A direct method was evaluated from the algorithm of Toeplitz matrix inversion when assuming a Toeplitz clutter correlation matrix. This direct method for pre-filter adaptation shows low fluctuation even with short time constants. The method is based on a recursive estimation of the mean. A system with quick reaction to sudden changes in clutter correlation can be realized by regulating the time constant from the filter output correlation. Costs for implementation of the direct method were estimated. ESRO

N75-13841# Naval Electronic Systems Test and Evaluation Detachment, Patuxent River, Md.

CERTIFICATION TEST PROCEDURES FOR AIRCRAFT APPROACH CONTROL AN/SPN-41

1 Feb. 1974 33 p

(AD-786207; NESTED-022-106) Avail: NTIS CSCL 17/7

Aircraft Approach Control AN/SPN-41, composed of shipboard and airborne equipments, can be used as an independent landing aid or as a Mode I monitor on AN/SPN-42 equipped carriers. In order to satisfactorily accomplish this monitoring, each piece of equipment must operate within allowable tolerances. The tests are designed to provide the criteria for initial and periodic checks of the system to ensure operation within acceptable limits. There are three categories of certification tests. Category I tests are the basic equipment tests. Category II tests are pierside flights to check the system alignment and correlation of the AN/SPN-41 with the AN/SPN-42, the AN/SPN-35, and the FLOLS (Fresnel Lens Optical Landing System). Category III tests are the at-sea flight tests using aircraft equipped to record data. GRA

N75-13842# Autonetics, Anaheim, Calif.

CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 1: SUMMARY Final Report, Oct. 1972 - Oct. 1973

H. T. Freedman, C. S. Hoffman, B. N. Gaon, T. Felisky, and W. R. Fried Feb. 1974 117 p 10 Vol.

(Contract DOT-TSC-508)

(PB-234264/0; DOT-TSC-OST-73-29-1-Vol-1) Avail: NTIS HC $5.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The results of studies and analyses directed toward the definition of a Satellite-Based Advanced Air Traffic Management System (SAATMS) are presented. This system is an advanced, integrated air traffic control system which is based on the use of a satellite constellation for surveillance, navigation, and communications. The system is disigned to service the anticipated air traffic density (commercial, military, and general aviation) predicted for the period from 1995 and beyond. The major items discussed in this report include the definition of user classes, the management concept, the system services and functions, the system description, system costs, the system performance, transition into full system operation, and the RDT and E plan. The report is presented in ten volumes. This volume summarizes the study findings. GRA

N75-13843# Autonetics, Anaheim, Calif.

CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 2: SYSTEM FUNCTIONAL DESCRIPTION AND SYSTEM CLASSIFICA-

TION Final Report, Oct. 1972 - Oct. 1973
R. G. Loeliger, J. H. Mitzel, C. S. Hoffman, H. T. Freedman, and K. C. Kochi Feb. 1974 151 p 10 Vol.
(Contract DOT-TSC-508)
(PB-234265/7; DOT-TSC-OST-73-29-2-Vol-2) Avail: NTIS HC $6.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

A functional description and specification for the Satellite-Based Advanced Air Traffic Management System is presented. The system description is presented in terms of the surveillance, navigation, and communications functions along with the additional supportive subfunctions needed to implement the basic functions. The volume includes a description of the basic system and backup philosophy, the system architecture and information flow between the elements required to achieve a cohesive system organization, and the satellite constellation and tracking subsystem. A preliminary system specification in the format of MIL-STD-490A is also presented. GRA

N75-13844# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 3: SUBSYSTEM FUNCTIONAL DESCRIPTION Final Report, Oct. 1972 - Oct. 1973
R. G. Loeliger, F. S. Nakamoto, R. A. Gronlund, H. T. Freedman, and J. W. Petway Feb. 1974 214 p 10 Vol.
(Contract DOT-TSC-508)
(PB-234266/5; DOT-TSC-OST-73-29-3-Vol-3) Avail: NTIS HC $7.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

A description of the subsystems that comprise the Satellite-Based Advanced Air Traffic Management System is presented. Described in detail are the surveillance, navigation, communications, data processing, and airport subsystems. The electronics required to implement each subsystem is also presented. The subsystem descriptions include a detailed description of the subsystem mechanization, the rationale for its selection, and the expected performance of each subsystem. The electronics are presented in block diagram form. Particular emphasis is placed on the integrated avionic hardware associated with each subsystem mechanization. Included in the mechanization description of each subsystem are the basic analyses, algorithms, and equations that were used to implement the subsystem. GRA

N75-13845# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 4: OPERATIONAL DESCRIPTION AND QUALITATIVE ASSESSMENT Final Report, Oct. 1972 - Oct. 1973
C. S. Hoffman, H. T. Freedman, C. V. Hamilton, and W. R. Fried Feb. 1974 115 p refs 10 Vol.
(Contract DOT-TSC-508)
(PB-234267/3; DOT-TSC-OST-73-29-4-Vol-4) Avail: NTIS HC $5.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

A description of how the Satellite-Based Advanced Air Traffic Management System (SAATMS) operates and a qualitative assessment of the system are presented. The operational description includes the services, functions, and tasks performed by the system, a description of user classes, the airspace structure, and rules and procedures. The concept for managing air traffic is then presented. It is characterized by pilot responsibility for conforming to a flight path while the ground concentrates on assuring flight safety, maximizing capacity, and minimizing delay. A discussion of the SAATMS automation philosphy and a description of how an aircarrier and a GA aircraft fly through the system complete the operational description. GRA

N75-13846# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 5: SYSTEM PERFORMANCE Final Report, Oct. 1972 - Oct. 1973
J. C. Elsey, J. B. King, I. M. Weiss, K. M. Armstrong, and C. Chen Feb. 1974 146 p refs 10 Vol.
(Contract DOT-TSC-508)
(PB-234268/1; DOT-TSC-OST-73-29-5-Vol-5) Avail: NTIS HC $5.75; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The volume presents the results of the performance evaluation of the Satellite-Based Advanced Air Traffic Management System (SAATMS). The evaluation established the capacity, safety, and delay performance of the system for the Los Angeles Basin terminal area operation. The results of the performance evaluation were compared to the established performance specification. SAATMS provides capacity exceeding the highest traffic demand projected for 1995 while meeting the delay specification and maintaining the safety level provided by the present system. An evaluation of enroute safety is presented, along with a comparison of the enroute safety provided by the present system and a Ground-Based Advanced Air Traffic Management System (GAATMS). Author (GRA)

N75-13847# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 6: DEVELOPMENT AND TRANSITION PLANS Final Report, Oct. 1972 - Oct. 1973
H. T. Freedman, W. R. Fried, C. S. Hoffman, J. B. King, and C. V. Hamilton Feb. 1974 114 p refs 10 Vol.
(Contract DOT-TSC-508)
(PB-234269/9; DOT-TSC-OST-73-29-6-Vol-6) Avail: NTIS HC $5.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The volume presents the plans for implementing the Satellite-Based Advanced Air Traffic Management System (SAATMS) described in Volumes II, III, and IV. Two plans are presented: an RDT and E plan and a transition plan. The RDT and E plan is presented as a series of task descriptions which delineate the activities that must be performed to generate requirements and to develop the hardware and software that comprise the various components of the system. The plan also describes those management tasks necessary to document and control the orderly development of the system. Development schedules and associated costs are also presented.
Author (GRA)

N75-13848# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 7: SYSTEM COST Final Report, Oct. 1972 - Oct. 1973
T. Felisky and H. T. Freedman Feb. 1974 159 p refs 10 Vol.
(Contract DOT-TSC-508)
(PB-234270/7; DOT-TSC-OST-73-29-7-Vol-7) Avail: NTIS HC $6.25; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The volume presents estimates of the federal government and user costs for the Satellite-Based Advanced Air Traffic Management System and the supporting rationale. The system configuration is that presented in volumes II and III. The cost estimates are also based upon the development and transition plans in Volume VI. The costing methodology and procedures used are presented. Cost summaries and detailed cost breakdowns by Research summaries and detailed cbst breakdowns by Research and Development, Facilities and Equipment, and Operations and Maintenance costs for the ground sites and satellites are provided for the federal government costs. Summaries and breakdowns by user class and by purchase, installation, and maintenance costs are provided for the user avionics cost. Various cost analyses are also provided, including the estimated annual expenditures for various transition schedules and comparisons with ground-based ATC systems. Author (GRA)

N75-13849# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 9: SYSTEM AND SUBSYSTEM PERFORMANCE MODELS Final Report, Oct. 1972 - Oct. 1973
C. Chen, R. G. Loeliger, F. S. Nakamoto, J. C. Elsey, and J. B. King Feb. 1974 138 p refs 10 Vol.
(Contract DOT-TSC-508)
(PB-234272/3; DOT-TSC-OST-73-29-9-Vol-9) Avail: NTIS HC $5.75; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The volume presents the models used to analyze basic features of the system, establish feasibility of techniques, and evaluate

system performance. The models use analytical expressions and computer simulations to represent the relationship between system structure and state variables, system inputs, and system output measures. GRA

N75-13850# Autonetics, Anaheim, Calif.
CONCEPT FOR A SATELLITE-BASED ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM. VOLUME 10: SUBSYSTEM PERFORMANCE REQUIREMENTS Final Report, Oct. 1972 - Oct. 1973
J. B. King, C. I. Chen, and R. P. Utsumi Feb. 1974 94 p 10 Vol.
(Contract DOT-TSC-508)
(PB-234273/1; DOT-TSC-OST-73-29-10-Vol-10) Avail: NTIS HC $4.75; HC also available from NTIS $37.00/set of 10 reports as PB-234263-SET CSCL 17G

The volume presents the results of the subsystem performance requirements study for an Advanced Air Traffic Management System (AATMS). The study determined surveillance and navigation subsystem requirements for terminal and enroute area operations. It also established the approach guidance requirements for VOR, Category I, and Category II landing conditions. The results of the VVOR suitability analysis indicated that approach guidance requirements for VOR landing conditions were approximately the same as those for terminal area operations. A discussion of the methodology used in the study and a description of the models and simulations used to establish the subsystem performance requirements is also presented. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N75-13851*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A STOL AIRWORTHINESS INVESTIGATION USING A SIMULATION OF A DEFLECTED SLIPSTREAM TRANSPORT. VOLUME 1: SUMMARY OF RESULTS AND AIRWORTHINESS IMPLICATIONS
Robert L. Stapleford, Robert K. Heffley, Robert C. Rumold, Charles S. Hynes, and Barry C. Scott Oct. 1974 44 p refs Prepared in cooperation with Systems Technol., Inc., Mountain View, Calif. and FAA, Moffett Field, Calif. 3 Vol.
(Contract NAS2-6433)
(NASA-TM-X-62392; FAA-RD-74-143-1; A-5794; STI-TR-1014-3-Vol-1) Avail: NTIS HC $3.75 CSCL 01C

A simulator study of short takeoff and landing (STOL) aircraft was conducted using a model of a deflected slipstream transport aircraft. The subjects considered are: (1) the approach, (2) flare and landing, (3) go-around, and (4) takeoff phases of flight. The results are summarized and possible implications with regard to airworthiness criteria are discussed. A data base is provided for future STOL airworthiness requirements and a preliminary indication of potential problem areas is developed. Comparison of the simulation results with various proposed STOL criteria indicates significant deficiencies in many of these criteria. Author

N75-13852*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A STOL AIRWORTHINESS INVESTIGATION USING A SIMULATION OF A DEFLECTED SLIPSTREAM TRANSPORT. VOLUME 2: SIMULATION DATA AND ANALYSIS
Robert L. Stapleford, Robert K. Heffley, Wayne F. Jewell, John M. Lehman, Charles S. Hynes, and Barry C. Scott Oct. 1974 243 p refs Prepared in cooperation with Systems Technol., Inc., Mountain View, Calif. and FAA, Moffett Field, Calif. 3 Vol.
(Contract NAS2-6433)
(NASA-TM-X-62393; FAA-RD-74-143-2; A-5795; STI-TR-1014-3-Vol-2) Avail: NTIS HC $7.50 CSCL 01C

A description of the simulation procedures used in analyzing the airworthiness criteria for short takeoff and landing (STOL) transport aircraft with deflected airstream lift augmentation is presented. The data include performance measures, pilot commentary, and pilot ratings. A pilot/vehicle analysis of glide slope tracking and an analysis of the flare maneuver are included. Author

N75-13853*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A STOL AIRWORTHINESS INVESTIGATION USING A SIMULATION OF A DEFLECTED SLIPSTREAM TRANSPORT. VOLUME 3: BREGUET 941S SIMULATION MODEL
Robert K. Heffley, Wayne F. Jewell, Robert L. Stapleford, Samuel J. Craig, Charles S. Hynes, and Barry C. Scott Oct. 1974 79 p refs Prepared in cooperation with Systems Technology, Inc., Mountain View, Calif. and FAA, Moffett Field, Calif.
(Contract NAS2-6433)
(NASA-TM-X-62394; FAA-RD-74-143-3; STI-TR-1014-3-Vol-3; A-5796) Avail: NTIS HC $4.75 CSCL 01C

Flight simulation tests were conducted to determine the airworthiness of the Breguet 941S transport aircraft. The aircraft is a short takeoff and landing configuration with deflected slipstream lift augmentation. The flight regimes investigated include the following: (1) acceleration to takeoff and initial climbout, (2) transition from cruise to STOL approach configurations, (3) IFR/VFR approach, (4) flare, touchdown, and landing rollout, (5) missed approach, and (6) high lift configuration stalls. The model was developed by matching actual flight test data for the BR 941S aircraft. When this was not possible, wind tunnel data and engineering estimates were used. Results of the simulation are presented in graph and tabular form. Author

N75-13854*# Boeing Commercial Airplane Co., Seattle, Wash.
JET NOISE SUPPRESSOR NOZZLE DEVELOPMENT FOR AUGMENTOR WING JET STOL RESEARCH AIRCRAFT (C-8A BUFFALO)
D. L. Harkonen, C. C. Marks, and J. V. OKeefe Dec. 1974 144 p refs
(Contract NAS2-7641)
(NASA-CR-137522; D6-41324-3) Avail: NTIS HC $5.75 CSCL 01C

Noise and performance test results are presented for a full-scale advanced design rectangular array lobe jet suppressor nozzle (plain wall and corrugated). Flight design and installation considerations are also discussed. Noise data are presented in terms of peak PNLT (perceived noise level, tone corrected) suppression relative to the existing airplane and one-third octave-band spectra. Nozzle performance is presented in terms of velocity coefficient. Estimates of the hot thrust available during emergency (engine out) with the suppressor nozzle installed are compared with the current thrust levels produced by the round convergent nozzles. Author

N75-13855# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Flugtechnik.
INFLUENCE OF VELOCITY DEPENDENT PITCHING MOMENTS ON THE LONGITUDINAL STABILITY [UNTERSUCHUNG UEBER DEN EINFLUSS GESCHWINDIGKEITSABHAENGIGER NICKMOMENTE AUF DIE LAENGSSTABILITAET]
Gottfried Sachs 15 Jul. 1973 62 p refs In GERMAN
(IFD-1/73) Avail: NTIS HC $4.25

The effect of velocity dependent pitching moments on longitudinal stability was investigated for three velocity ranges relating to gliding flight of VTOL aircraft, slow flight (including the aerodynamically lifted STOL range), and fast flight (high subsonic and supersonic). The effect on the principal ratio of pitch velocity and pitch control systems was investigated for gliding flight. The variation of the eigenvalues for slow flight is presented, and it is shown that the effect of pitching moments on the phygoid damping depends on the angle of incidence. The effects of density gradients were examined for fast flight. ESRO

N75-13856# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Flugtechnik.
EFFECT OF DOWNSPRINGS AND BOBWEIGHTS ON THE

DYNAMIC LONGITUDINAL STABILITY [UNTERSUCHUNG UEBER DIE AUSWIRKUNGEN VON ZUSATZFEDERN UND ZUSATZGEWICHTEN AUF DIE DYNAMISCHE LAENGS-STABILITAET]
Gottfried Sachs 31 Jul. 1973 42 p refs In GERMAN
(IFD-2/73) Avail: NTIS HC $3.75

The effect was investigated of downsprings and bobweights on dynamic stability. Separate treatment of aircraft motion and the control system was assumed. The degree of angle of incidence instability to which an aircraft can be stabilized statically and dynamically is presented. The critical ranges with regard to lowest stability range for the application of downsprings and bobweights are indicated, and the flight mechanical parameters which have a determining effect are described. Conditions were derived under which it is not possible to apply a downspring without increasing the existing dynamic instability. ESRO

N75-13857# Bell Helicopter Co., Fort Worth, Tex.
EVALUATION OF THE ADHESIVE BONDING PROCESSES USED IN HELICOPTER MANUFACTURE. PART 7: PREPRODUCTION EVALUATION OF IMPROVED TITANIUM SURFACES PREPARATION
Narvel L. Rogers Sep. 1974 68 p refs
(Contract DAAA21-74-C-0109)
(AD-785597; PA-TR-4700-Pt-7) Avail: NTIS CSCL 13/8

The phosphate-fluoride treatment (stabilized) has been compared directly to a standard Phosphate-Fluoride treatment for the surface preparation of commercially pure titanium sheet. The stabilized treatment process was found to provide an improvement in the durability of adhesive bonded joints exposed to moisture and stress. The treatment processes were compared for their effect on the properties of the basis metal as well as for bondability and durability. Laboratory evaluations included standard specification qualification testing as well as special durability tests. Author (GRA)

N75-13858# Fiber Service, Inc., Gardena, Calif.
STRUCTURAL EVALUATION OF UH-1D TUBULAR ROTOR BLADE Final Report
Don Cook Aug. 1974 63 p refs
(Contract DAAJ02-73-C-0042; DA Proj. 1F1-62208-A-170)
(AD-786560; USAAMRDL-TR-74-41) Avail: NTIS CSCL 01/3

The purpose of this evaluation was to determine the effects of static loading, cyclic loading and ballistic damage/repairs on the stiffness and resonant behavior of three full-scale, filament-wound tubular-reinforced UH-1D main rotor blades (S/N 001, S/N 002, and S/N 003) previously fabricated under Contract DAAJ02-72-C-013. Blades S/N 001 and S/N 002 were made predominately from glass fibers. Blade S/N 003 included the use of Kevlar 49 as the skin fiber. All three blades were subjected to static deflection, dynamic, proof, creep, fatigue, and ultimate testing. In addition, blades S/N 002 and S/N 003 were subjected to ballistic impact, ball drop, and simulated tree strike testing. (Modified author abstract) GRA

N75-13859# Army Foreign Science and Technology Center, Charlottesville, Va.
AERODYNAMICS OF AIR CUSHION CRAFT, CHAPTER 6, SECOND EDITION
I. T. Egprov 19 Feb. 1974 100 p refs Transl. into ENGLISH from the book "Gidrodinamika Bystrokhodnykh Sudov" Lenigrad, Sudostroyeniye, 1971 100 p
(AD-786800; FSTC-HT-23-2547-72) Avail: NTIS CSCL 01/3

The principles of support on an air cushion and classification of air cushion devices and craft are presented. Calculations of power consumption for creation of lift and for overcoming drag are presented. The components of supporting forces and of the drag forces are analyzed and approximate methods for estimating them are discussed. Detailed calculations of flexible skirts, as well as data and specific examples are presented. A final long section is devoted to presentation of calculations, results of calculations and of wind tunnel and towing basin tests, as well as extensive supporting data in the form of graphs and nomograms. GRA

N75-13860# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CERTAIN DEVELOPMENT TRENDS IN THE MECHANICS OF DEFORMABLE BODY IN KAZAN
K. Z. Galimov 29 Jul. 1974 53 p refs Transl. into ENGLISH from Issledovaniya Po Teorii Plastin I Obolochek, (USSR), no. 9, 1972 p 55-92
(AD-786118; FTD-MT-24-341-74) Avail: NTIS

Scientific work of the collective of the department of structural mechanics of flying vehicles of KAI (Kazan Aviation Institute), from the day the department was created, is progressing in the following two basic directions: the development of the calculation methods for the structural strength of flying vehicles and experimental studies of their static and dynamic strength; and the development and perfection of methods of the theory elasticity. This work is devoted only to the first direction. GRA

N75-13861# Army Aviation Systems Test Activity, Edwards AFB, Calif.
DETERMINATION OF AIRCRAFT CABIN RADIATION, CONDUCTION, AND CONVECTION HEAT TRANSFER COEFFICIENTS
Emmett J. Laing 1974 15 p refs
(AD-785646) Avail: NTIS CSCL 01/3

To properly design aircraft instruments, avionics, and other equipment, which is installed in aircraft cabin areas, it is necessary to accurately know the cabin temperature environment. Aircraft cabin temperatures vary widely depending on the aircraft operating condition, basic design parameters, and type of environmental control system installed. It is suspected that high aircraft cabin static temperatures may increase aircraft component failure rates, cause equipment to temporarily malfunction, and directly cause equipment failure. However, accurate temperature data for the static environment are not available for many aircraft. To obtain this type of data, USAASTA, with the assistance of the United States Army Air Mobility Research and Development Laboratory Eustis Directorate, has conducted comprehensive static temperature survey on five first-line United States Army helicopters. GRA

N75-13797 De Havilland Aircraft Co., Ltd., Downsview (Ontario).
RESEARCH INTO POWERED HIGH LIFT SYSTEMS FOR AIRCRAFT WITH TURBOFAN PROPULSION
B. Eggleston *In* AGARD V/STOL Aerodyn. Oct. 1974 17 p refs (For availability see N75-13795 05-02)

N75-13799 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
WIND TUNNEL INVESTIGATION OF THREE POWERED LIFT STOL CONCEPTS
R. F. Osborn and G. S. Oates *In* AGARD V/STOL Aerodyn. Nov. 1974 12 p refs (For availability see N75-13795 05-02)

N75-13803 Societe Bertin et Cie, Plaisir (France).
PRESENTATION OF AERODYNAMIC AND ACOUSTIC RESULTS OF QUALIFICATION TESTS ON THE ALADIN 2 CONCEPT [PRESENTATION DES RESULTATS AERODYNAMIQUES ET ACOUSTIQUES DES ESSAIS DE QUALIFICATION OU CONCEPT ALADIN 2]
Maurice Collard, Claude Doyotte, and Max Sagner *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs In FRENCH (For availability see N75-13795 05-02)

N75-13811 Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
JET LIFT PROBLEMS OF V/STOL AIRCRAFT
J. Barche *In* AGARD V/STOL Aerodyn. Oct. 1974 18 p refs (For availability see N75-13795 05-02)

N75-13816* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MEASUREMENT OF TILT ROTOR VTOL ROTOR WAKE-AIRFRAME GROUND AERODYNAMIC INTERFERENCE FOR APPLICATION TO REAL TIME FLIGHT SIMULATION
Troy M. Gaffey (Bell Helicopter Co., Ft. Worth, Tex.) and Martin D. Maisel *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)
CSCL 01C

N75-13817 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Flight Control Div.
US AIR FORCE V/STOL AIRCRAFT AERODYNAMIC PREDICTION METHODS
Henry W. Woolard *In* AGARD V/STOL Aerodyn. Oct. 1974 14 p refs (For availability see N75-13795 05-02)

N75-13819 British Aircraft Corp., London (England). Military Aircraft Div.
A REVIEW OF THE LIFTING CHARACTERISTICS OF SOME JET LIFT V/STOL CONFIGURATIONS
P. G. Knott and J. J. Hargreaves *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

N75-13820* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
REQUIREMENT FOR SIMULATION IN V/STOL RESEARCH AIRCRAFT PROGRAMS
Hervey C. Quigley and Curt A. Holzhauser *In* AGARD V/STOL Aerodyn. Oct. 1974 11 p refs (For availability see N75-13795 05-02)
CSCL 01C

N75-13829 Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
DESCRIPTION OF AN AIRSHIP DESIGN: LIMITS FOR SPEED, SIZE, ADAPTABILITY [BESCHREIBUNG EINES LUFTSCHIFF-ENTWURFS. GRENZEN FUER GESCHWINDIGKEIT, GROESSE, EINSATZFAEHIGKEIT]
H. Toennes *In its* Airships Jun. 1974 p 95-105 In GERMAN (For availability see N75-13826 05-02)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N75-13862# Tyco Labs., Inc., Pomona, Calif. Nucleonics Div.
NUCLEAR HELICOPTER AIR DENSITY INDICATING SYSTEM FLIGHT TEST PROGRAM
Donald W. Blincow Jul. 1974 68 p refs
(Contract DAAJ02-73-C-0015; DA Proj. 1F1-62203-A-434)
(AD-786565; ER-9016; USAAMRDL-TR-74-19) Avail: NTIS CSCL 01/1

This report describes the design, construction, and testing of the Nuclear Helicopter Air Density Indicating (NUHADI) system. The NUHADI measures the scattering of X-rays, generated by an isotopic source, from the air volume outside the helicopter. The number of X-rays backscattered into the detector is proportional to the number of molecules per unit volume, i.e., the air density. The air scatter signal is compared to an internal signal, from the same source, during each cycle to provide a continuous self calibration. (Modified author abstract) GRA

N75-13863# Instrument Flight Center, Randolph AFB, Tex.
EVALUATION OF THE BENDIX ALTITUDE WARNING SYSTEM Final Report
James M. Rogers Sep. 1974 20 p
(IFC Proj. TE-72-6)
(AD-786461; IFC-TR-74-3) Avail: NTIS CSCL 01/4

A pilot factors evaluation of an altitude warning system (AWS) to determine its acceptability for use in Air Force aircraft. The system has the primary function of assisting pilots in attaining and was conducted maintaining assigned of desired (command) altitudes. A secondary function was to examine the concept of altitude warning during landing approaches. Eleven AWS sorties were flown in a Northrup T-38 Talon, and 33 sorties in a North American T-39 Sabreliner. The majority of pilots considered that an altitude warning devise served as a viable altitude reminder and warning system, reducing the possibility of altimeter misinterpretation. Although several deficiencies were found, the major problem associated with the AWS is the inaccuracy of the trigger levels. (Modified author abstract) GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-13864*# Kanner (Leo) Associates, Redwood City, Calif.
THE EFFECT OF AIR PRECOOLING PRIOR TO COMPRESSION IN AIR-BREATHING ENGINES FOR A SPACE VEHICLE CARRIER. COMPARATIVE ANALYSIS, WITH SPECIAL CONSIDERATION GIVEN TO THE REAL-GAS BEHAVIOR OF FLUIDS Ph.D. Thesis - Technische Hochschule Aachen
H. Kuenkler Jan. 1975 136 p refs Transl. into ENGLISH from Der Einfluss der Luftvorkuehlung vor der Verdichtung bei Luftatmenden Antrieben eines Raumfahrzeugtraegers. Vergleichende Analyse unter Besonderer Beruecksichtigung des Realgasverhaltens der Fluide, 10 Nov. 1973 221 p
(Contract NASw-2481)
(NASA-TT-F-16093) Avail: NTIS HC $5.75 CSCL 21E

The requirements for air-breathing power plants were determined. The possibilities and requirements were evaluated for controlling thermodynamic processes which results from the peculiarities of their utilization in a space vehicle carrier. The effect of air precooling prior to compression on the performance of air-breathing turbojets was investigated, using the project design of a turbojet engine as an example. A quantitative comparison with the important competing power plant concepts was made to determine the suitability of this engine in an aerodynamic booster stage. Author

N75-13865*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
SCRAMJET NOZZLE DESIGN AND ANALYSIS AS APPLIED TO A HIGHLY INTEGRATED HYPERSONIC RESEARCH AIRPLANE
William J. Small, John P. Weidner, and P. J. Johnston Nov. 1974 56 p refs
(NASA-TM-X-71972) Avail: NTIS HC $4.25 CSCL 21E

The configuration and performance of the propulsion system for the hypersonic research vehicle are discussed. A study of the interactions between propulsion and aerodynamics of the highly integrated vehicle was conducted. The hypersonic research vehicle is configured to test the technology of structural and thermal protection systems concepts and the operation of the propulsion system under true flight conditions for most of the hypersonic flight regime. The subjects considered are: (1) research vehicle and scramjet engine configurations to determine fundamental engine sizing constraints, (2) analytical methods for computing airframe and propulsion system components, and (3) characteristics of a candidate nozzle to investigate vehicle stability and acceleration performance. Author

N75-13866*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
UNIFIED ANALYSIS OF DUCTED TURBOMACHINERY NOISE
William E. Zorumski and Harold C. Lester 16 Dec. 1974 44 p refs Presented at the 88th Meeting of the Acoust. Soc. of Am., St. Louis, 5-8 Nov. 1974
(NASA-TM-X-72633) Avail: NTIS HC $3.75 CSCL 20A

The methodologies of Hanson and Zorumski are combined to yield a unified analysis of ducted turbomachinery noise. It is shown that the far-field broad-band and discrete noise spectral components can be expressed in terms of modal cross-spectral matrices and directivity vectors which are derivable from the duct analysis. Author

N75-13867*# University of Southern Calif., Los Angeles. Dept. of Aerospace Engineering.
ORDERED STRUCTURES AND JET NOISE
R. A. Petersen, R. E. Kaplan, and J. Laufer Oct. 1974 58 p refs

(Contract NAS3-17857)
(NASA-CR-134733) Avail: NTIS HC $4.25 CSCL 20A

A series of measurements of near field pressures and turbulent velocity fluctuations were made in a jet having a Reynolds nuber of about 50,000 in order to investigate more quantitatively the character and behavior of the large scale structures, and to ascertain their importance to the jet noise problem. It was found tyat the process of interaction between vortices can be inhibited by artificially exciting the shear layers with periodic disturbances of certain frequency. The turbulent fluctuation amplitudes measured at four diameters downstream decreased considerably. Finally, it was observed that the passage frequency of the structures decreased with x in a similar manner as the frequency corresponding to the maximum intensity radiation emanating from the same value of x. Author

N75-13868*# Massachusetts Inst. of Tech., Cambridge. Flight Transportation Lab.

THE COST OF NOISE REDUCTION IN COMMERCIAL TILT ROTOR AIRCRAFT

Henry B. Faulkner Aug. 1974 161 p refs
(Contract NAS2-7620)
(NASA-CR-137552; FTL-R74-5) Avail: NTIS HC $6.25 CSCL 01C

The relationship between direct operating cost (DOC) and departure noise annoyance was developed for commercial tilt rotor aircraft. This was accomplished by generating a series of tilt rotor aircraft designs to meet various noise goals at minimum DOC. These vehicles were spaced across the spectrum of possible noise levels from completely unconstrained to the quietest vehicle that could be designed within the study ground rules. A group of optimization parameters were varied to find the minimum DOC while other inputs were held constant and some external constraints were met. This basic variation was then extended to different aircraft sizes and technology time frames. It was concluded that reducing noise annoyance by designing for lower rotor tip speeds is a very promising avenue for future research and development. It appears that the cost of halving the annoyance compared to an unconstrained design is insignificant and the cost of halving the annoyance again is small. Author

N75-13869*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF INDUCER INLET AND DIFFUSER THROAT AREAS ON PERFORMANCE OF A LOW PRESSURE RATIO SWEPTBACK CENTRIFUGAL COMPRESSOR

Hugh A. Klassen Washington Jan. 1975 26 p refs
(NASA-TM-X-3148; E-8010) Avail: NTIS HC $3.75 CSCL 21E

A low-pressure-ratio centrifugal compressor was tested with nine combinations of three diffuser throat areas and three impeller inducer inlet areas which were 75, 100, and 125 percent of design values. For a given inducer inlet area, increases in diffuser area within the range investigated resulted in increased mass flow and higher peak efficiency. Changes in both diffuser and inducer areas indicated that efficiencies within one point of the maximum efficiency were obtained over a compressor specific speed range of 27 percent. The performance was analyzed of an assumed two-spool open-cycle engine using the 75 percent area inducer with a variable area diffuser. Author

N75-13870*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PREDICTION OF AXIAL-FLOW INSTABILITIES IN A TURBOJET ENGINE BY USE OF A MULTISTAGE COMPRESSOR SIMULATION ON THE DIGITAL COMPUTER

Carl J. Daniele, Ronald J. Blaha, and Kurt Seldner Washington Jan. 1975 36 p refs
(NASA-TM-X-3134; E-8008) Avail: NTIS HC $3.75 CSCL 21E

A method of estimating the undistorted stall line for an axial-flow compressor by using the digital computer is presented. The method involves linearization of nonlinear dynamic equations about an operating point on a speed line, and then application of the first method of Lyapunov to determine the stability of the nonlinear system from the stability of the linear system. The method is applied to a simulation of the J85 compressor, which utilizes stage stacking and lumped volume techniques for the interstage regions to simulate steady-state and dynamic compressor performance. The stability boundary predicted by the digital simulation compares quite well with the stall line predicted by a dynamic simulation of the J85 compressor programmed on the analog computer. Since previous studies have shown that the analog-predicted stall line agrees well with the stall line of the compressor, the digital method presented is also a good means of estimating the stall line. Author

N75-13871*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

VARIABLE COMBUSTOR GEOMETRY FOR IMPROVING THE ALTITUDE RELIGHT CAPABILITY OF A DOUBLE ANNULAR COMBUSTOR

Donald F. Schultz Washington Jan. 1975 26 p refs
(NASA-TM-X-3163; E-8058) Avail: NTIS HC $3.75 CSCL 21E

A test program was conducted to evaluate several ways of improving the altitude relight capability of a double annular ram-induction combustor designed for Mach 3.0 cruise operation. Using various techniques including two modes of simulated combustor variable geometry, altitude relights were obtained down to a pressure of 3.6 newtons per square centimeter against 7.05 newtons per square centimeter for the unmodified combustor. This was at a test condition of 0.05 reference Mach number using ambient temperature inlet air and fuel. Author

N75-13872# Technische Hochschule, Aachen (West Germany). Inst. fuer Strahlantriebe und Turboarbeitsmaschinen.

THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON THE DEVELOPMENT OF A SUPERSONIC COMPRESSOR STAGE [THEORETISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN ZUR ENTWICKLUNG EINER UEBERSCHALLVERDICHTERSTUFE]

H. Simon and D. Bohn Bonn Bundeswehramt 1974 102 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(BMVG-FBWT-74-5) Avail: NTIS HC $5.25; Bundeswehramt 30 DM

Two supersonic compressor stages, a supersonic rotor/shock-instator type stage and a shock-in-rotor/shock-in-stator stage, were designed and tested. Both include a tandem diffusor row. Fluid flow through the supersonic rotor was calculated by applying the method of characteristics to stream surfaces. Experimental results on the supersonic rotor agree with calculated design values. Test results show lower values for the shock-in-rotor/type compared with the supersonic rotor as a result of shock-boundary layer interactions. The measured values indicate a deviation from the design values due to the higher stator upstream Mach numbers and to stator incidences. A static pressure ratio of 3.5 at a total isentropic efficiency of about 70% was attained for the supersonic compressor stage. ESRO

N75-13873# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Inst. fuer Turbulenzforschung.

DESCRIPTION OF TURBULENCE AND NOISE OF AN AXISYMMETRIC SHEAR FLOW

Alfons Michalke and Helmut V. Fuchs 12 Jul. 1974 70 p refs Sponsored by Deut. Forschungsgemeinschaft prepared jointly with Tech. Univ. Berlin
(DLR-FB-74-50) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 24,40 DM

A method was developed to describe the statistical properties of the turbulent fluctuation field in a shear flow with an axisymmetric geometry. The fluctuating pressure field can be resolved, by cross correlation analysis, into those azimuthal constituents which best represent the large scale coherent phenomena hidden in semmingly disordered jet turbulence. In addition, the analytical expansion scheme for the noise from circular jets can be specified to the case in which the pressure itself acts as the dominating source function. i.e. to the noise originating from mean flow-turbulence interactions. Experiments were performed in a 10 cm circular model jet at very low efflux velocities and reveal that in the relevant range of Strouhal numbers between 0.1 and 1 the first three to four source quantity. A strictly axisymmetric ring vortex model, however, is shown to be inappropriate. ESRO

N75-13874# Hamilton Standard, Windsor Locks, Conn.
ADVANCED FEASIBILITY INVESTIGATION FOR DETERMINING ARMY HELICOPTER GAS TURBINE ENGINE MAXIMUM POWER AVAILABLE Final Report
Edward V. Fox, Salvador Ledesma, Anthony J. Martin, Allen Rapp, and Roy W. Schneider Aug. 1974 175 p refs
(Contract DAAJ02-73-C-0047; DA Proj. 1F1-62203-AH-86)
(AD-786546; HSER-6392; USAAMRDL-TR-74-49) Avail: NTIS CSCL 21/5

The purpose of the first investigation was to determine the feasibility of developing a method to predict, with an accuracy of better than plus or minus 1%, the maximum power which can be produced by a helicopter gas turbine engine at full-power conditions. The prediction was to be made using information obtained from the engine while the engine was operated prior to lift-off at a partial-power condition of no more than 30% of normal rated power. The prediction method was to be capable of identifying the changes in maximum engine power available due to all possible types of engine deterioration and all ambient conditions. This is a follow-on program to determine the effects of higher power levels, a continuous update system, and improved sensor accuracies on the possible improvement of MPA prediction accuracy. GRA

N75-13875# Pratt and Whitney Aircraft, West Palm Beach, Fla.
LOW-POWER TURBOPROPULSION COMBUSTOR EXHAUST EMISSIONS. VOLUME 3: ANALYSIS Final Report, 1 Apr. - 30 Jun. 1974
Stanley A. Mosier and Richard Roberts Jul. 1974 63 p refs
(Contract F33615-71-C-1870; AF Proj. 3066)
(AD-784900: PWA-FR-6487-Vol-3; AFAPL-TR-73-36-Vol-3) Avail: NTIS CSCL 21/5

The exploratory development effort to formulate and develop a computerized theoretical model to predict emission characteristics of gas turbine combustors and to identify, evaluate, and demonstrate improved combustion design techniques for increasing combustion efficiency at part power operating conditions was expanded to include detailed computer model and experimental data analyses. The generalized combustor computer program was used to predict exhaust emission concentrations from five different gas turbine engine burners; predictions were then compared with measured data. In general, excellent agreement was achieved. In addition, a detailed comparative analysis of experimental data generated during the low-pressure and high-pressure test programs was conducted. From this analysis a phenomenological model for the premixing tube/virtual staging burner was prepared. Finally, a workhorse, variable geometry premixing burner was designed for reducing concentrations of exhaust emissions over the operating range from part to full power. Author (GRA)

N75-13876# Mitre Corp., McLean, Va.
AIRCRAFT SOUND DESCRIPTION SYSTEM (ASDS) APPLICATION PROCEDURES. VOLUME 2: MANUAL APPLICATION PROCEDURES
Donald Goldman and Francis X. Maginnis Mar. 1974 56 p ref
(Contract DOT-FA69NS-162)
(AD-786613; MTR-6616-Vol-2; FAA-EQ-74-2-2) Avail: NTIS

The Aircraft Sound Description System (ASDS) is a method of describing aircraft noise. It has been established as the basic FAA technique for predicting community noise exposure caused by aircraft operations. This report (in four volumes) is a description of the manual and computer techniques for applying ASDS as well as a current set of noise exposure contours. This volume presents the manual procedure for developing an Aircraft Sound Description System (ASDS) application in a step-by-step fashion. This procedure develops the aircraft noise exposure values and the Situation Index. Data forms and pictorial layouts are used to illustrate the procedure. A sample application is presented to explain the details of each step. Author (GRA)

N75-13814 Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio. Prototype Div.
DESIGN AND TEST OF EJECTOR THRUST AUGMENTATION CONFIGURATIONS
S. L. Brown and R. D. Murphy *In* AGARD V/STOL Aerodyn. Oct. 1974 12 p refs (For availability see N75-13795 05-02)

N75-13830 Luftschifftechnik ALV, Graz (Austria).
THE NUCLEAR AIRSHIP ALV-C/1 [DAS ATOMLUFTSCHIFF ALV-C/1]
Erich VonVeress *In* DGLR Airships Jun. 1974 p 107-131 In GERMAN (For availability see N75-13826 05-02)

N75-13831 Deutsche Studiengemeinschaft fuer Luftschiffahrt, Frankfurt am Main (West Germany).
FLIGHT IN UNDULATED FLOW: AIRSHIPS WITH NON-POLLUTING PROPULSION SYSTEMS [DER FLUG IN GEWELLTER STROEMUNG. LUFTSCHIFFE MIT UMWELTFREUNDLICHEM ANTRIEBSSYSTEM]
E. Krueger and W. Happel *In* DGLR Airships Jun. 1974 p 133-137 In GERMAN (For availability see N75-13826 05-02)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N75-13877*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MOVING-BASE VISUAL SIMULATION STUDY OF DECOUPLED CONTROLS DURING APPROACH AND LANDING OF A STOL TRANSPORT AIRCRAFT
G. Kimball Miller, Jr. and Perry L. Deal Washington Jan. 1975 76 p refs
(NASA-TN-D-7790; L-9721) Avail: NTIS HC $4.75 CSCL 01C

The simulation employed all six rigid-body degrees of freedom and incorporated aerodynamic characteristics based on wind-tunnel data. The flight instrumentation included a localizer and a flight director which was used to capture and to maintain a two-segment glide slope. A closed-circuit television display of a STOLport provided visual cues during simulations of the approach and landing. The decoupled longitudinal controls used constant prefilter and feedback gains to provide steady-state decoupling of flight-path angle, pitch angle, and forward velocity. The pilots were enthusiastic about the decoupled longitudinal controls and believed that the simulator motion was an aid in evaluating the decoupled controls, although a minimum turbulence level with root-mean-square gust intensity of 0.3 m/sec (1 ft/sec) was required to mask undesirable characteristics of the moving-base simulator. Author

N75-13878*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CURVED DESCENDING LANDING APPROACH GUIDANCE AND CONTROL M.S. Thesis - George Washington Univ.
Daniel J. Crawford Dec. 1974 74 p refs
(NASA-TM-X-72200) Avail: NTIS HC $4.25 CSCL 01C

Linear optimal regulator theory is applied to a nonlinear simulation of a transport aircraft performing a helical landing approach. A closed form expression for the quasi-steady nominal flight path is presented along with the method for determining the corresponding constant nominal control inputs. The Jacobian matrices and the weighting matrices in the cost functional are time varying. A method of solving for the optimal feedback gains is reviewed. The control system is tested on several alternative landing approaches using both three and six degree flight path angles. On each landing approach, the aircraft was subjected to large random initial state errors and to randomly directed crosswinds. The system was also tested for sensitivity to changes in the parameters of the aircraft and of the atmosphere. Performance of the optimal controller on all the three degree approaches was very good, and the control system proved to be reasonably insensitive to parametric uncertainties. Author

N75-13879# Deutsche Gesellschaft fuer Luft- und Raumfahrt, Cologne (West Germany).
FLIGHT MECHANICS AND CONTROL ACTIVITIES OF THE

COMMITTEES IN 1972 [DGLR-FACHGRUPPE 4 FLUGMECHANIK UND FLUGFUEHRUNG. TAETIGKEIT DER FACHAUSSCHUESSE 1972]
Gerhard Bruening 12 Jun. 1974 52 p In GERMAN; ENGLISH summary
(DLR-MITT-74-24) Avail: NTIS HC $4.25; ZLDI, Munich 13,50 DM

Summaries of lectures held during 1972 in the fields of flight mechanics, flight control, and guidance are presented. A name and keyword is included. ESRO

N75-13880# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugfuehrung.
ON THE PROPERTIES OF THE GENERALIZED INTEGRAL OF SQUARED ERROR (GISE) Ph.D. Thesis - Brunswick Univ. [UEBER DIE EIGENSCHAFTEN DER VERALLGEMEINERTEN QUADRATISCHEN REGELFLAECHE]
Tuncer Miski 10 Jun. 1974 110 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-45) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 22 DM

It is shown that a system minimizing a GISE approximates a model. The poles and zeros of this model can be determined from the weighting factors of the GISE. Inversely, a GISE can be selected such that the associated optimal system meets practical engineering specifications. For linear time-invariant single input systems, it is shown that any admissible quadratic cost functional is equivalent to a GISE. By minimizing this GISE, a suboptimal control law can be established when some state variables are not accessible. Results are illustrated by designing an altitude controller and a flight path angle controller for an executive aircraft. Author (ESRO)

N75-13881# Honeywell, Inc., Minneapolis, Minn. Government and Aeronautical Products Div.
MILITARY TRANSPORT (C-141) FLY-BY-WIRE PROGRAM. VOLUME 1: CONTROL LAW DEVELOPMENT, SYSTEM DESIGN AND PILOTED SIMULATION EVALUATION Final Report, 15 Apr. 1971 - 31 Jan. 1974
David Lair, John Bunnell, Howard B. Larson, Laurence D. Roberts, and Charles R. Zimmer Apr. 1974 216 p refs
(Contract F33615-71-C-1286; AF Proj. 1987)
(AD-786896; GAPD-2760-45554-Vol-1; AFFDL-TR-74-52-Vol-1) Avail: NTIS CSCL 01/4

This program was conducted to prove the feasibility of using fly-by-wire (FBW) control system technology to improve the controllability of a large military transport aircraft during the performance of specific difficult mission tasks, and to reduce pilot workload. The program consisted of (1) investigation of FBW control laws for typical large military jet transports; (2) computer evaluation of FBW control laws utilizing a moving base piloted simulator; (3) design and development of hardware utilizing off-the-shelf components, insofar as possible, to evaluate the control laws; (4) system integration testing; (5) aircraft installation and ground testing; and (6) flight testing of the FBW system on board a C-141 aircraft. (Modified author abstract) GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N75-13882*# Scientific Translation Service, Santa Barbara, Calif.
MISSION AND ORGANIZATION OF THE DFVLR: TWO YEARS OF INTEGRATED SOCIETY OF GERMAN AERONAUTICAL AND SPACE FLIGHT RESEARCH
Volker Aschoff Washington NASA Dec. 1974 34 p Transl. into ENGLISH from Ueber die Aufgabe und die Organisation der DFVLR: Zwei Jahre Einheitsgesellschaft der Deutschen Luft- und Raumfahrtforschung, (Porz), Sep. 1971 p 114-146
(Contract NASw-2483)
(NASA-TT-F-16086) Avail: NTIS HC $3.75

A historical review on organizational developments of the German aeronautical societies is followed by a description of management methods for modern aerospace research facilities. The development history of the German Society for Aerospace Research is outlined and its scientific and geographic organizations are described. The various institutes of the society are assigned individual research on flow mechanics; flight mechanics and control materials and construction; propulsion and energy electronics and aerospace physics, simulation, and medicine. Author

N75-13883# National Aviation Facilities Experimental Center, Atlantic City, N.J.
FLIGHT TESTS OF THE ROME AIR DEVELOPMENT CENTER TARGET ENHANCING LINEAR RELAY SYSTEM Final Report, Jan. - Mar. 1974
Dominick Offi Oct. 1974 27 p
(AD-787309; FAA-RD-74-141) Avail: NTIS HC $3.75

An aircraft echo-area enhancement device, developed by the Stanford Research Institute for the USAF Rome Air Development Center, was flight tested at the National Aviation Facilities Experimental Center. The device, known as a target enhancing linear relay system was installed aboard a Piper Cherokee 180 aircraft and tracked with the airport surveillance radar-5 test bed. The data was analyzed to determine the extent of improved target detection capability afforded by the enhancer. Flight tests indicated the system was an effective echo-area enhancer when the aircraft was at long ranges in a tail-on aspect, and that performance was affected by antenna shielding problems. It was recommended that development of similar systems be continued, with emphasis on solving possible radiofrequency interference, economic, and antenna problems. Author

N75-13884# IIT Research Inst., Annapolis, Md.
COMPATIBILITY ANALYSIS OF THE TEXAS INSTRUMENTS, ITT/GILFILLAN, BENDIX, AND HAZELTINE MICROWAVE LANDING SYSTEM PROPOSALS Final Report
Robert A. Frazier Jun. 1974 92 p Sponsored in part by DOD
(Contract DOT-FA70WAI-175)
(AD-787180; FAA-RD-74-98; ECAC-PR-74-021) Avail: NTIS HC $3.25

The microwave landing system (MLS) proposal was modeled in a 1980 high density environment. Its channel scheme and signal format were analyzed with the aid of a computer program to determine its adequacy in such a high density environment. Three other MLS proposals were also examined. A comparison was made between the technical parameters of each and the parameters recommended by the Radio Technical Commission for Aeronautics Special Committee-117 (RTCA SC-117) to determine if the results of a previous analysis of the SC-117 MLS format could be applied to any of the three proposals. Author

N75-13885# Avcon Universal Consultants Corp., Baden, Pa.
DEVELOPMENT OF MICROWAVE LANDING SYSTEM IMPLEMENTATION CRITERIA Final Report
Thomas L. Croswell Jun. 1974 49 p ref
(Contract DOT-FA74WI-5138-1)
(AD-785220; AV-MLS-74-1; FAA-RD-74-121) Avail: NTIS HC $3.25

Guidelines are derived for MLS implementation planning from basic safety requirements for landing systems, from contemporary qualification criteria, and from existing system status. A quantitative method was developed to facilitate evaluation of alternative MLS implementation plans, based on the conclusion that instrument approaches to ILS and MLS represent an increase in safety over approaches made to nonprecision facilities. Substantiation of this conclusion, validation of the method, projection of instrument approaches, and other steps leading to a detailed MLS implementation schedule are defined and their accomplishment recommended. Author

N75-13886*# Virginia Univ., Charlottesville. Dept. of Engineering Science and Systems.

DEVELOPMENT OF A SUPERCONDUCTOR MAGNETIC SUSPENSION AND BALANCE PROTOTYPE FACILITY FOR STUDYING THE FEASIBILITY OF APPLYING THIS TECHNIQUE TO LARGE SCALE AERODYNAMIC TESTING Final Report, 1 Sep. 1969 - 30 Sep. 1974

R. N. Zapata, R. R. Humphris, and K. C. Henderson Jan. 1975 59 p

(Grant NGR-47-005-112)

(NASA-CR-141284; ESS-4009-102-75) Avail: NTIS HC $4.25 CSCL 01A

The basic research and development work towards proving the feasibility of operating an all-superconductor magnetic suspension and balance device for aerodynamic testing is presented. The feasibility of applying a quasi-six-degree-of freedom free support technique to dynamic stability research was studied along with the design concepts and parameters for applying magnetic suspension techniques to large-scale aerodynamic facilities. A prototype aerodynamic test facility was implemented. Relevant aspects of the development of the prototype facility are described in three sections: (1) design characteristics; (2) operational characteristics; and (3) scaling to larger facilities. Author

N75-13887# Sandia Labs., Albuquerque, N.Mex. Radiation Div.

SANDIA LABORATORIES' HENKE X-RAY SYSTEM

L. W. Morrison and K. M. Glibert Jul. 1974 63 p

(Contract AT(29-1)-789)

(SAND-74-0008) Avail: NTIS HC $4.25

An X-ray system is described with particular emphasis on design, construction, and operation. This system incorporates the X-ray tube design of B. L. Henke, and provides monoenergetic soft X-rays with energies between 1.26 and 14.2 keV, the average energies for Mg and Sr, respectively, and intensities on the order of 0.0001 watts/steradian. Author

N75-13888# Signatron, Inc., Lexington, Mass.

TROPO DIVERSITY SIMULATOR DEVELOPMENT Final Report, Dec. 1973 - Mar. 1974

Leonard Ehrman Jul. 1974 164 p refs

(Contract F30602-73-C-0216)

(AD-786420; RADC-TR-74-188) Avail: NTIS CSCL 17/2

The report covers the work performed during the expansion of a previously developed quad diversity, two-tap troposcatter simulator into its fully instrumented design. The simulator developed under this contract is a quad diversity, sixteen-tap troposcatter simulator having a multipath delay spread that is adjustable between 0.1 and 1.5 microseconds. This program has resulted in the development of a device that provides repeatable and controllable laboratory quality instrumentation. It will accurately simulate the effects of multipath, independent signal fades in both amplitude and phase along with receiver noise on troposcatter communications links. The simulator was designed to be interfaced between modem equipments operating at an IF frequency of 70 MHz and with signal bandwidths up to 10 MHz. GRA

N75-13889# Hughes Aircraft Co., Culver City, Calif.

TACTICAL DATA SYSTEMS DESIGN CONCEPTS EVALUATION Research and Development Report, Apr. 1973 - Mar. 1974

D. K. Eto, E. Streeter, and J. W. Weber May 1974 115 p refs

(Contract F33615-73-C-3123; AF Proj. 1987)

(AD-786469; SD-45087; AFFDL-TR-74-53) Avail: NTIS CSCL 15/7

Portions of a flight data management system for a single-seat multiple-role fighter bomber were simulated in a man/machine simulation facility. The effects of various combinations of manual or automatic target tracking and manual or automatic aircraft steering on system performance and pilot workload were investigated. Starting from a normal configuration of automatic target tracking, manual aircraft steering, and manual weapon release, the increase in pilot workload and degradation of release point error caused by manual target tracking was shown to be considerable. Additionally, the increase in system performance and reduction of pilot workload with the addition of a flight command function that integrates the weapon delivery calculations with the flight control system was demonstrated. (Modified author abstract) GRA

N75-13890# Air Force Human Resources Lab., Brooks AFB, Tex.

ADVANCED SIMULATION IN UNDERGRADUATE PILOT TRAINING (ASUPT) FACILITY UTILIZATION PLAN Interim Report, Mar. 1972 - Mar. 1974

William V. Hagin and James F. Smith Jun. 1974 36 p

(AF Proj. 1123)

(AD-786411; AFHRL-TR-74-43) Avail: NTIS CSCL 05/9

The capabilities of a flight simulation research facility located at Williams AFB, AZ are described. Research philosophy to be applied is discussed. Long range and short range objectives are identified. A time phased plan for long range research accomplishment is described. In addition, some examples of near term research efforts which will be conducted during periods when the total system is not available are described in some detail. These projects address immediate simulator user's needs. Author (GRA)

N75-13891# Army Material Command, Texarkana, Tex. Intern Training Center.

APPLICATIONS OF HELICOPTER MOCKUPS TO MAINTAINABILITY AND OTHER RELATED ENGINEERING DISCIPLINES Final Report

Edwin David Hawkins Mar. 1974 59 p refs

(AD-786500; USAMC-ITC-02-08-73-105) Avail: NTIS CSCL 01/3

The purpose of the study is to present applications of helicopter mockups to the engineering disciplines involved in the design. The paper consists of a series of examples and suggestions, discussing how mockups can be used for: (1) Integration and coordination between customer/contractor/subcontractor/vendor levels; (2) coordination between engineering design and support groups at the contractor level; (3) improved design and demonstration of human factors and maintainability related functions. Proper application of mockups results in a savings of time, materials, and money during the later states of development. The final outcome is a more cost effective project. Author (GRA)

N75-13892# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.

COMPUTER PROGRAM FOR THE PREDICTION OF AIRCRAFT RESPONSE TO RUNWAY ROUGHNESS. VOLUME 2: USER'S MANUAL Final Report, Oct. 1971 - Apr. 1973

Anthony G. Gerardi and Adolph K. Lohwasser Apr. 1974 101 p refs

(AF Proj. 683M)

(AD-786490; AFWL-TR-73-109-Vol-2) Avail: NTIS CSCL 01/5

A computer program has been developed for use in determining the dynamic response of an aircraft to runway roughness during takeoff and constant speed taxi. The mathematical model has been programmed in FORTRAN for a CDC 6600 digital computer. A typical takeoff simulation requires less than 200 seconds of computer time and less than 77,000 octal storage locations. The output from the program is in two formats, a digital listing and a Calcomp-plotted time history. The plotted output is very useful in evaluating results. Author (GRA)

N75-13893# Ung (Man T.), El Segundo, Calif.

RECOMMENDED REQUIREMENTS FOR THE UNIVERSAL AIRCRAFT FLIGHT SIMULATOR/TRAINER Final Report

Man T. Ung Jun. 1974 32 p refs

(Contract F04700-74-C-0328)

(AD-786047; AFFTC-TR-74-23) Avail: NTIS CSCL 14/2

This report investigates various forms of computation and makes recommendations on one computing system most suitable for the UAFS/T on the basis of performance and economy. It is determined that, at this time, hybrid computation is still the least expensive means of doing real-time flight simulation of two concurrent aircraft systems without compromising the high-frequency variables. Based upon the present and future needs

of the AFFTC, a representative hybrid computer configuration is drawn up. Author (GRA)

N75-13894# Ballistic Research Labs., Aberdeen Proving Ground, Md.
SEQUENCE LASER INTERFEROMETRY IN A MUZZLE JET FLOW SIMULATOR
Fritz H. Oertel 1974 16 p refs
(AD-785659) Avail: NTIS CSCL 19/4

This paper describes a technique found useful to obtain several sequence laser interferograms of jet flow development. From these (finite fringe) interferograms, the density distribution in the entire flow field may, in principle, be obtained using the reduction technique. Sample interferograms, as well as spark shadowgrams which show qualitative details of the flow to support the interferograms, are shown and discussed. Some quantitative results are presented. GRA

N75-14535 Max-Planck-Institut fuer Festkoerperforschung, Grenoble (France).
THE MAGNETIC FIELD FACILITY IN GRENOBLE
H.-J. Schneider-Muntau *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 120-145 refs (For availability see N75-14531 05-70)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N75-13895*# TRW Systems, Redondo Beach, Calif.
MISSION REQUIREMENTS CSM-111/DM-2: APOLLO/SOYUZ TEST PROJECT, CHANGE A
Stanley M. Blackmer 25 Nov. 1974 163 p refs
(Contract NAS9-13834)
(NASA-CR-141466; JSC-08819) Avail: NTIS HC $6.25 CSCL 22A

The primary mission objective is described as the development and testing of systems for rendezvous and docking of future manned spacecraft (including Apollo and Soyuz spacecraft) and stations which would be suitable for use as a standard international system. The conduct of the mission is detailed, along with mission planning support for the implementation and accomplishment of specified inflight experiments and demonstrations. N.E.R.

N75-13896*# Massachusetts Inst. of Tech., Cambridge.
THERMAL ANALYSIS OF M552 EXPERIMENT FOR MATERIALS PROCESSING IN SPACE Final Report
T. Muraki and K. Masubuchi Oct. 1974 48 p refs
(Contract NAS8-28732)
(NASA-CR-129043) Avail: NTIS HC $3.75 CSCL 22C

Analytical and experimental studies made of heat flow in the exothermic brazing unit in the M552 experiment are described. The emphasis of the studies was placed on heat flow in the tube and the sleeve during a period from ignition to the time when the brazing alloy solidifies. Experiments were made of three specimens tested in a ground-based laboratory. Heat flow was determined by thermocouples. The analytical study covered two phases: (1) the effect of reduced gravity on heat flow in the exothermic brazing unit; and (2) the development of analytical models. The major mode of heat transfer was conduction and the effect of gravity was minimal. Good agreements were obtained between experimental and analytical results indicating the soundness of the analytical models. Author

N75-13897# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
PROPOSALS FOR SPACE RESEARCH IN 1974 [PROPOSITIONS DE RECHERCHE SPATIALE EN 1974]
G. Courtes 6 Mar. 1973 28 p In FRENCH
(LAS-73-DRT-PRJ-02) Avail: NTIS HC $3.75

Various proposals for space research in 1974 are presented. The present D2B, FAUST, S183 and JANUS programs are to be continued. New projects are called for in cooperation with NASA, including participation in the Apollo Soyuz project, the space shuttle program, and the LST project. Budgeting for these projects is given together with other proposed experiments, such as balloon flights and earth resources instruments. ESRO

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N75-13898*# Interactive Computer Systems, Inc., Athens, Ga.
A MAN IN THE LOOP TRAJECTORY OPTIMIZATION PROGRAM (MILTOP) Final Report
Juris Reinfields 1974 89 p refs
(Contract NAS8-29029)
(NASA-CR-120560) Avail: NTIS HC $4.75 CSCL 22A

An interactive trajectory optimization program is developed for use in initial fixing of launch configurations. The program is called MILTOP for Man-In-the-Loop-Trajectory Optimization-Program. The program is designed to facilitate quick look studies using man-machine decision combinations to reduce the time required to solve a given problem. MILTOP integrates the equations of motion of a point-mass in 3-Dimensions with drag as the only aerodynamic force present. Any point in time at which an integration step terminates, may be used as a decision-break-point, with complete user control over all variables and routines at this point. Automatic phases are provided for different modes of control: vertical rise, pitch-over, gravity turn, chi-freeze and control turn. Stage parameters are initialized from a separate routine so the user may fly as many stages as his problem demands. The MILTOP system uses both interactively on storage scope consoles, or in batch mode with numerical output on the live printer. Author

N75-13899# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
FILTERING THEORY APPLIED TO ORBIT DETERMINATION
V. Torroglosa Dec. 1973 59 p refs
(Contract ESRO-341/71-AR)
(N-5/225/504/73.012; ESRO-CR(P)-532) Avail: NTIS HC $4.25

The extended Kalman filter and the Jazwinski filter were modified and compared with the classical extended Kalman filter in applications to orbit determination using real data of the satellites RAE-B, IMP-J and ERTS 1. ESRO

N75-13900# Instituto Nacional de Tecnica Aeroespacial, Madrid (Spain).
ACCURATE INTEGRATION OF ORBITS USING DELAUNAY-SIMILAR ELEMENTS
Antonio Penas Dec. 1973 100 p refs
(Contract ESRO-341/71-AR)
(N-5/225/504/73.011; ESRO-CR(P)-533) Avail: NTIS HC $4.75

The application of Delaunay-Similar (DS) elements formulation in the variation-of-parameters orbit generator capability of the Goddard Trajectory Determination System (GTDS) is discussed. The DS elements formulation uses the true anomaly as the independent variable. Two versions of the DS orbit generators were studied. Numerical results are presented for the resulting orbit generators, including cost (number of perturbing acceleration evaluations) versus accuracy plots. Numerical results of the Cowell time regularized and KS orbit generators are compared with the results of the DS orbit generators. Optimization of the DS orbit generator with respect to the order of the integration process and the integration algorithm is discussed. Author (ESRO)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N75-13901# Aerospace Corp., El Segundo, Calif.
MISSION PLANNING PROGRAM: USAGE GUIDE
R. H. Prislin, W. F. Rearlick, and D. C. Walker 15 Jun. 1974 197 p refs
(Contract F04701-73-C-0074)
(AD-786020; TR-0074(9320)-4; SAMSO-TR-74-188) Avail: NTIS CSCL 22/1

The Mission Planning Program (MPP) is designed to solve problems related to ground site-to-vehicle visibility. It was written specifically for the CDC 6000/7000 computer series to operate as a stand-alone program in a batch-processing environment. Therefore, no special features or limitations are imposed by the hardware configuration or operating system interfaces. This document is intended to serve as a user's guide for MPP. It describes the program's capabilities, operating modes, and the basic deck structures required (including control cards and input data). GRA

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N75-13902*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
LASER GEODYNAMIC SATELLITE THERMAL/OPTICAL/VIBRATIONAL ANALYSES AND TESTING. VOLUME 1: EXECUTIVE SUMMARY Final Report, Jan. - Sep. 1974
Oct. 1974 22 p ref
(Contract NAS8-30658)
(NASA-CR-120562; BSR-4159-Vol-1) Avail: NTIS HC $3.25 CSCL 22B

The results of the LAGEOS Thermal/Optical/Vibrational Analyses and test program conducted for the National Aeronautics and Space Administration are presented. The purpose of this study is to verify, through analysis and test, that the MSFC LAGEOS design inherently provides a retroreflector thermal environment which maintains acceptable retroreflector internal thermal gradients. Acceptable thermal gradients are those which result in less than 50% degradation of optical performance from isothermal optical performance. This volume provides an executive summary of the study program. It summarizes the study objectives, the study approach, the principal assumptions, the type of basic data generated and the significant results. Author

N75-13903*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
LASER GEODYNAMIC SATELLITE THERMAL/OPTICAL/VIBRATIONAL ANALYSES AND TESTING. VOLUME 2: TECHNICAL REPORT, BOOK 1 Final Report
Oct. 1974 359 p refs
(Contract NAS8-30658)
(NASA-CR-120563; BSR-4159-Vol-2-Bk-1) Avail: NTIS HC $10.00 CSCL 22B

The results of the LAGEOS thermal/optical/vibrational analysis and test program are reported. Through analyses and tests it is verified that the MSFC LAGEOS design provides a retroreflector thermal environment which maintains acceptable retroflector internal thermal gradients. The technical results of the study, organized by the major task areas are presented. The interrelationships of the major tasks are described and the major decisions are identified. Author

N75-13904*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
LASER GEODYNAMIC SATELLITE THERMAL/OPTICAL/VIBRATIONAL ANALYSES AND TESTING. VOLUME 2: TECHNICAL REPORT, BOOK 2 Final Report, 3 May - 30 Aug. 1974
Oct. 1974 341 p refs
(Contract NAS8-30658)
(NASA-CR-120564; BSR-4159-Vol-2-Bk-2) Avail: NTIS HC $9.50 CSCL 22B

A detailed analysis of a fused silica cube-corner retroreflector is presented. The effects of manufacturing errors and temperature variations, which may affect the performance of the cube-corner retroreflector are included. The process used in the cube-corner performance is illustrated. The effect of manufacturing error and the effects of manufacturing error combined with various temperature profiles were examined. The effects of a nonuniform wedge angle with manufacturing error and with a manufacturing/temperature profile combination were also analyzed. Author

N75-13905*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
LASER GEODYNAMIC SATELLITE/THERMAL/OPTICAL VIBRATIONAL ANALYSES AND TESTING. VOLUME 2: TECHNICAL REPORT, BOOK 3 Final Report
Oct. 1974 325 p
(Contract NAS8-30658)
(NASA-CR-120565; BSR-4159-Vol-2-Bk-3) Avail: NTIS HC $9.25 CSCL 22B

The overall plan for accomplishing the various tests required to achieve the program objectives and tasks of the LAGEOS thermal/optical/vibration analysis and test program is described. The requirements for each test are identified for the purpose of program review for the design and fabrication of the required test article and test fixtures, for the allocation of test facilities, equipment and expendables, and for the generation of the detail test procedures by which the specified data will be obtained at specified test conditions. The current internal test program schedules, by which the various individual preparatory subtasks are to be accomplished to ensure that the individual test will be conducted within the time period required to meet program objectives are included. Author

N75-13906*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
APOLLO EXPERIENCE REPORT: GUIDANCE AND CONTROL SYSTEMS: COMMAND AND SERVICE MODULE ENTRY MONITOR SUBSYSTEM
Ben Reina, Jr. and Herbert G. Patterson Washington Jan. 1975 27 p ref
(NASA-TN-D-7859; JSC-S-405) Avail: NTIS HC $3.75 CSCL 22C

The conceptual aspects of the command and service module entry monitor subsystem, together with an interpretation of the displays and their associated relationship to entry trajectory control, are presented. The entry monitor subsystem is described, and the problems encountered during the developmental phase and the first five manned Apollo flights are discussed in conjunction with the design improvements implemented. Author

N75-13907# Eurosat S.A., Geneva (Switzerland).
STUDY ON THE ECONOMIC RETURN OF AN OPERATIONAL MARITIME SATELLITE SYSTEM. ANNEX 2: COMPUTER PRINTOUTS Final Report
1974 113 p
(Contract ESRO-SC/27-HQ)
(ESRO-CR(P)-513) Avail: NTIS HC $5.25

Outputs of computer runs, using a mathematical model for studying the economic viability of a worldwide maritime communication satellite system, are presented. ESRO

N75-13908# Dornier-System G.m.b.H., Friedrichshafen (West Germany).
CABLE BOOM SYSTEM FOR SPIN-STABILIZED SATELLITES. VOLUME 1: DESIGN STUDY REPORT
C. C. Etzler and G. K. Schmidt Dec. 1973 128 p 2 Vol.
(Contract ESTEC-1511/71-AA)

(ESRO-CR(P)-535-Vol-1) Avail: NTIS HC $5.75

A cable boom system for the GEOS satellite was designed. The system enables the placement and operation of sensors or experiments at the end of a cable, while retaining contact with the satellite through power and signal connections. The cable selection, drum, flexlead, wormgear, motor, and bearings, are detailed, and the overall configuration is described. A flat cable has been selected, which is stowed on a rotating drum. A variable reluctance stepper motor in combination with a self-locking worm gear is used for deployment control. ESRO

N75-13909# Dornier-System G.m.b.H., Friedrichshafen (West Germany).

CABLE BOOM SYSTEM FOR SPIN-STABILIZED SATELLITES. VOLUME 2: TESTING, RESULTS AND CONCLUSIONS Final Report

Karl Haas, Guenter K. Schmidt, Heinz Wunderwald, Baur, and Schaeffenacker Dec. 1973 120 p refs Prepared jointly with AEG-Telefunken 2 Vol.

(Contract ESTEC-1511/71-AA)

(ESRO-CR(P)-536-Vol-2) Avail: NTIS HC $5.25

A cable boom system for the GEOS satellite was tested. The system enables the placement and operation of sensors or experiments at the end of a cable, while retaining contact with the satellite through power and signal connections. A flat cable was selected, which is stowed on a rotating drum. A variable reluctance stepper motor in combination with a self-locking worm gear is used for deployment control. Performance tests and results are presented. A high degree of reliability was demonstrated. ESRO

N75-13910# European Space Research and Technology Center, Noordwijk (Netherlands).

DEVELOPMENT, LAUNCH AND IN-FLIGHT PERFORMANCE OF ESRO SOUNDING-ROCKET PAYLOADS. VOLUME 5: PAYLOADS LAUNCHED IN 1969

Y. P. G. Guerin, comp. Paris ESRO May 1974 157 p

(ESRO-SP-80-Vol-5) Avail: NTIS HC $6.25

The technical reports on the payloads carried by ESRO sounding rockets are summarized. In a very condensed standard format, they describe successively: the scientific experiments making up the payload; the time schedule achieved for the construction and launch of the payload; the mechanical and electrical design of the payload and the outstanding events occurring during its integration; preparation on the range and launch theory; the behavior of the payload and its in-flight operation. In most cases, experience acquired during the lifetime of the payload has made it possible to put forward recommendations on how to improve the quality of future payloads and how to attempt to improve their reliability. Author (ESRO)

N75-13911# Compteurs Schlumberger, Montrouge (France).

THE ANALYSIS, EVALUATION AND OPTIMIZATION OF SATELLITE-BORNE POWER-SUPPLY UNITS WITH THE AID OF A COMPUTER Final Report [ANALYSE, EVALUATION ET OPTIMISATION PAR CALCULATEUR DES UNITES DE PUISSANCE D'UN SATELLITE]

J. Arbes, A. Bazin, B. Potin, and J. Tessier Paris ESRO May 1974 109 p refs In FRENCH

(Contract ESTEC-1134/70)

(ESRO-CR-205) Avail: NTIS HC $5.25

A computer simulation for the analysis, evaluation, and optimization of spaceborne power conditioning units is presented. The mathematical models used to describe the units, their components, and optimization methods are detailed. The implementation computer program structure is outlined. Use of this program is intended to help in the design of integrated satellite power supply systems taking into account state of the art techniques and requirements imposed by the satellite mission. ESRO

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

No abstracts in this category.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support.* For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N75-13912*# Hughes Aircraft Co., Los Angeles, Calif. Space and Communications Group.

DESIGN ANALYSIS AND COMPUTER-AIDED PERFORMANCE EVALUATION OF SHUTTLE ORBITER ELECTRICAL POWER SYSTEM. VOLUME 1: SUMMARY Final Report

Oct. 1974 245 p refs

(Contract NAS9-13779)

(NASA-CR-140382; S-3-74-085-Vol-1; D1191-Vol-1) Avail: NTIS HC $7.50 CSCL 22B

Studies were conducted to develop appropriate space shuttle electrical power distribution and control (EPDC) subsystem simulation models and to apply the computer simulations to systems analysis of the EPDC. A previously developed software program (SYSTID) was adapted for this purpose. The following objectives were attained: (1) significant enhancement of the SYSTID time domain simulation software, (2) generation of functionally useful shuttle EPDC element models, and (3) illustrative simulation results in the analysis of EPDC performance, under the conditions of fault, current pulse injection due to lightning, and circuit protection sizing and reaction times. Author

N75-13913*# Wintec Corp., Los Angeles, Calif.

SHUTTLE FILTER STUDY. VOLUME 1: CHARACTERIZATION AND OPTIMIZATION OF FILTRATION DEVICES Final Report

Jun. 1974 158 p refs 3 Vol.

(Contract NAS9-11264)

(NASA-CR-140386; WDB-2000-Vol-1) Avail: NTIS HC $6.25 CSCL 22B

A program to develop a new technology base for filtration equipment and comprehensive fluid particulate contamination management techniques was conducted. The study has application to the systems used in the space shuttle and space station projects. The scope of the program is as follows: (1) characterization and optimization of filtration devices, (2) characterization of contaminant generation and contaminant sensitivity at the

component level, and (3) development of a comprehensive particulate contamination management plane for space shuttle fluid systems. Author

N75-13914*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
ERROR PROTECTION CAPABILITY OF SPACE SHUTTLE DATA BUS DESIGNS
G. E. Proch Aug. 1974 44 p
(Contract NAS9-12200)
(NASA-CR-140388; LEC-3926; JSC-09083; IN-74-EG-21) Avail: NTIS HC $3.75 CSCL 22B

Error protection assurance in the reliability of digital data communications is discussed. The need for error protection on the space shuttle data bus system has been recognized and specified as a hardware requirement. The error protection techniques of particular concern are those designed into the Shuttle Main Engine Interface (MEI) and the Orbiter Multiplex Interface Adapter (MIA). The techniques and circuit design details proposed for these hardware are analyzed in this report to determine their error protection capability. The capability is calculated in terms of the probability of an undetected word error. Calculated results are reported for a noise environment that ranges from the nominal noise level stated in the hardware specifications to burst levels which may occur in extreme or anomalous conditions. Author

N75-13915*# Boeing Aerospace Co., Seattle, Wash. Research and Engineering Div.
DYNAMICS OF MULTIRATE SAMPLED DATA CONTROL SYSTEMS Final Report, Oct. 1973 - Oct. 1974
Jay R. Naylor, Robert J. Hynes, and Daniel O. Molnar Oct. 1974 146 p refs
(Contract NAS9-13690)
(NASA-CR-141458; D180-18438-1) Avail: NTIS HC $5.75 CSCL 22B

The effect was investigated of the synthesis approach (single or multirate) on the machine requirements for a digital control system for the space shuttle boost vehicle. The study encompassed four major work areas: synthesis approach trades, machine requirements trades, design analysis requirements and multirate adaptive control techniques. The primary results are two multirate autopilot designs for the low Q and maximum Q flight conditions that exhibits equal or better performance than the analog and single rate system designs. Also, a preferred technique for analyzing and synthesizing multirate digital control systems is included. Author

N75-13916# Hawker Siddeley Dynamics, Ltd., Hatfield (England). Space Div.
INTERNATIONAL MAGNETOSPHERIC EXPLORER DAUGHTER STUDY REPORT. VOLUME 1: SUMMARY
J. W. Heaton, comp. Dec. 1973 41 p 3 Vol.
(Contract ESRO-1538/71-EL)
(HSD-TP-7433-Vol-1-Summ; ESRO-CR(P)-486) Avail: NTIS HC $3.75

The International Magnetospheric Explorer Daughter(IME-D) spacecraft feasibility study is summarized. Mission analysis, scientific payload, spacecraft system design, spacecraft subsystems, and spacecraft mechanical configuration are dealt with. ESRO

N75-13917# Hawker Siddeley Dynamics, Ltd., Hatfield (England). Space Div.
INTERNATIONAL MAGNETOSPHERIC EXPLORER DAUGHTER STUDY REPORT. VOLUME 2: MISSION DEFINITION
Dec. 1973 85 p 3 Vol.
(Contract ESRO-1538/71-EL)
(HSD-TP-7433-Vol-2; ESRO-CR(P)-487-Vol-2) Avail: NTIS HC $4.75

The International Magnetospheric Explorer Daughter spacecraft design aspects, including scientific payload, Delta 2914 launch vehicle performance, preferred orbit and orbit operations, are discussed. The scientific payload, enabling experiments on magnetic fields, medium energy particles, plasma waves, fast plasmas, and electron density, is dealt with. Mission requirements and constraints, launch window and orbit evaluation, mission profile, mother-daughter separation procedure, maneuver dynamics, and spacecraft dynamics are discussed. ESRO

N75-13918# Hawker Siddeley Dynamics, Ltd., Hatfield (England). Space Div.
INTERNATIONAL MAGNETOSPHERIC EXPLORER DAUGHTER SPACECRAFT STUDY. VOLUME 3: SPACECRAFT Final Report
Dec. 1973 243 p refs 3 Vol.
(Contract ESRO-1538/71-EL)
(HSD-TP-7433-Vol-3; ESRO-CR(P)-488-Vol-3) Avail: NTIS HC $7.50

A technical description of the International Magnetospheric Explorer Daughter (IME-D) spacecraft is given. The spacecraft system and subsystem is discussed, notably gas system, power, thermal control, data-handling, S-band communication, antenna and harness. The spacecraft mechanical configuration and the electromagnetic compatibility are dealt with. ESRO

N75-13919# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
STABILIZATION OF A GEOSTATIONARY SATELLITE BY MEANS OF REDUNDANT INERTIA WHEEL CONFIGURATIONS
Marc Reynier (CONES) 1974 35 p refs Presented at the 25th Intern. Astron. Congr., Amsterdam, 20 Sep. - 5 Oct. 1974
(LAAS-Publ-1198; ST-74-10) Avail: NTIS HC $3.75

The problems involved in redundant inertial wheel piloting of a geostationary satellite are detailed. A systematic search for mass optimal three axes redundancy was performed and digital laws of a more general nature were obtained through the use of noninteractive control. A digital computer enables enhanced flexibility, as the digital filter coefficients can be programmed in function of deterministic parameter variations occurring during the emission. An example of star sensor data output processing for detection of the yaw angle demonstrates the usefulness of onboard computers associated with the inertia wheel system. Computerized simulation of a complete model was performed pointing out effects masked in previous simplified models. ESRO

N75-13920# Aeritalia, Turin (Italy). Centro Elettronico Avio.
STUDY OF DETECTION AND ESTIMATION TECHNIQUES APPLIED TO ATTITUDE MEASUREMENTS OF SATELLITES. VOLUME 3: ANALYSIS OF SPECIFIC APPLICATIONS TO STAR MAPPER AND INFRARED EARTH SENSOR
D. Sciacovelli and A. Santinelli Apr. 1974 151 p refs Prepared jointly with Officine Galileo 4 Vol.
(Contract ESTEC-1775/72-AA)
(R-1177-CE-Vol-3; ESRO-CR(P)-552-Vol-3) Avail: NTIS HC $6.25

Analog matched filters for attitude sensing by means of star mappers and infrared earth sensors were considered. Two different filter configurations were examined for the silicon type star mapper, approximating the optimal matched filter. The first one consists of a simple bandpass filter realized by cascading and RC high pass and low pass filter. The second one consists of a high pass filter followed by a filter matched to the deterministic part of its input signal. A parametric evaluation of signal to noise ratios arising from use of the different filters is included. The possible use of a matched filter as compensation device for narrow field IR sensors was investigated. The usefulness of improving sensing accuracy by limiting the error due to input signal uncertainty, is discussed. ESRO

N75-13921# Aeritalia, Turin (Italy). Centro Elettronico Avio.
STUDY OF DETECTION AND ESTIMATION TECHNIQUES APPLIED TO ATTITUDE MEASUREMENTS OF SATELLITES. VOLUME 4: COMPUTER PROGRAMS DOCUMENTATION
A. Santinelli and D. Sciacovelli Apr. 1974 147 p ref Prepared jointly with Officine Galileo 4 Vol.
(Contract ESTEC-1775/72-AA)
(R-1178-CE-Vol-4; ESRO-CR(P)-553-Vol-4) Avail: NTIS HC $5.75

Computer programs related to the application of matched filters to star mappers and IR earth sensors are detailed. The following programs are listed: time domain synthesis, impulse

response of the matched filter, signal to noise ratio evaluation, integrated radiance profile, and earth infrared sensor simulation. ESRO

N75-13922# Aerospace Corp., El Segundo, Calif. Lab. Operations.
ANGLE-OF-ATTACK CONTROL OF SPINNING MISSILES
Daniel W. Platus 30 Jul. 1974 39 p refs
(Contract F04701-74-C-0075)
(AD-786781; TR-0075(5240-10)-3; SAMSO-TR-74-208) Avail: NTIS CSCL 16/2

The application of controlled wind-fixed pitch and yaw moments to control the coning angle of a spinning missile is described. The open-loop response to applied pitch and yaw moments is derived, and the closed-loop behavior of an angle-of-attack control system is analyzed. The angle-of-attack undamping due to a yaw moment is shown to be equal to that for steady roll resonance, and resonance is shown to be a limiting case of yaw moment undamping when the roll rate is equal to the critical frequency. The practical implementation of an angle-of-attack control system is described, and several applications are discussed, including passive angle-of-attack damping, roll lockin prevention, and drag control. Author (GRA)

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

N75-13923# Technische Universitaet, Brunswick (West Germany). Inst. fuer Datenverarbeitungsanalgen.
CORE AND PLATED WIRE MEMORIES WITH LOW POWER LOSS [KERN- UND DRAHTSPEICHER MIT GERINGER VERLUSTLEISTUNG]
Manfred Gaertner and Fritz Gliem Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 100 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol. (BMFT-FB-W-74-05) Avail: NTIS HC $4.75; ZLDI, Munich 21 DM

Possibilities for core memory power reduction are presented along with temperature behavior and energy requirements of the cores. Data are also given on wire memories and storage in semiconductor memories without energy supply, notably in metal nitride-oxide silicon storage cells. ESRO

N75-13924# Mullard, Ltd., Southampton (England).
MANUFACTURE OF PROTOTYPES OF HIGH CURIE TEMPERATURE SELF POLING TGS PYROELECTRIC DETECTORS FOR SPACE APPLICATIONS Final Report
R. A. Lockett [1973] 86 p
(Contract ESTEC-1500/71-AA)
(Rept-3028-U; ESRO-CR(P)-503) Avail: NTIS HC $4.75

The engineering phase of manufacturing pyroelectric detectors for horizon sensing in satellite attitude control is described. Growth of doped deuterated TGS was established with a uniformity of properties and on a scale sufficient to satisfy the needs of the engineering phase detector manufacture and possible future procurement phases. A detector housing suitable for the element configurations required by both a fan beam sensor and pencil beam sensor was designed and suitable designs for low noise preamplifiers were optimized. Sufficient prototypes were assembled to develop the method of manufacture and assembly and to determine the major performance parameters. ESRO

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N75-13925*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
COMBUSTION INSTABILITY WITH PARTIAL LENGTH ACOUSTIC LINERS Annual Report, 1 Dec. 1973 - 31 Dec. 1974
C. E. Mitchell, W. R. Espander, and M. R. Baer Dec. 1974 6 p refs
(Grant NGR-06-002-095)
(NASA-CR-141131) Avail: NTIS HC $3.25 CSCL 21H

The development of analytical techniques and numerical methods for the prediction of the stability behavior of liquid propellant rocket combustors is discussed. The studies involved nonlinear wave propagation effects and nonlinear combustion zone, liner, and nozzle responses. A second primary extension of the basic theory was directed at the inclusion of the effects of injector face baffles. Attention was restricted to the linear (small amplitude) problem, finite Mach numbers, three dimensional oscillations, and distributed combustion effects. Author

N75-13926*# Grumman Aerospace Corp., Bethpage, N.Y.
DEVELOPMENT OF TECHNOLOGY FOR MODELING OF A 1/8-SCALE DYNAMIC MODEL OF THE SHUTTLE SOLID ROCKET BOOSTER (SRB) Final Report
A. Levy, J. Zalesak, M. Bernstein, and P. W. Mason Jul. 1974 143 p refs
(Contract NAS1-10635)
(NASA-CR-132492) Avail: NTIS HC $5.75 CSCL 21H

A NASTRAN analysis of the solid rocket booster (SRB) substructure of the space shuttle 1/8-scale structural dynamics model. The NASTRAN finite element modeling capability was first used to formulate a model of a cylinder 10 in. radius by a 200 in. length to investigate the accuracy and adequacy of the proposed grid point spacing. Results were compared with a shell analysis and demonstrated relatively accurate results for NASTRAN for the lower modes, which were of primary interest. A finite element model of the full SRB was then formed using CQUAD2 plate elements containing membrane and bending stiffness and CBAR offset bar elements to represent the longerons and frames. Three layers of three-dimensional CHEXAI elements were used to model the propellant. This model, consisting of 4000 degrees of freedom (DOF) initially, was reduced to 176 DOF using Guyan reduction. The model was then submitted for complex Eigenvalue analysis. After experiencing considerable difficulty with attempts to run the complete model, it was split into two substructres. These were run separately and combined into a single 116 degree of freedom A set which was successfully run. Results are reported. Author

N75-13927*# Bell Aerospace Co., Buffalo, N.Y. Research and Engineering Dept.
DEVELOPING A GAS ROCKET PERFORMANCE PREDICTION TECHNIQUE Final Report, 1 Jun. 1973 - 30 May 1974
J. H. Morgenthaler, L. F. Moon, and W. R. Stepien 28 Oct. 1974 138 p refs
(Contract NAS3-16798)
(NASA-CR-134728; D9203-953001) Avail: NTIS HC $5.75 CSCL 21H

A simple, semi-empirical performance correlation/prediction technique applicable to gaseous and liquid propellant rocket engines is presented. Excellent correlations were attained for over 100 test firings by adjusting the computation of the gaseous mixing of an unreactive, coaxial jet using a correlation factor, F, which resulted in prediction of the experimental combustion efficiency for each firing. Static pressure, mean velocity and turbulence intensity in the developing region of non-reactive coaxial jets, typical of those of coaxial injector elements were determined. Detailed profiles were obtained at twelve axial

locations (extending from the nozzle exit for a distance of five diameters) downstream from a single element of the Bell Aerospace H2/O2 19-element coaxial injector. These data are compared with analytical predictions made using both eddy viscosity and turbulence kinetic energy mixing models and available computer codes. Comparisons were disappointing, demonstrating the necessity of developing improved turbulence models and computational techniques before detailed predictions of practical coaxial free jet flows are attempted. Author

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N75-13928# Technische Universitaet, Hanover (West Germany).
DETERMINATION OF THE ABSORPTION INDICES AND STRUCTURES OF DIELECTRIC EVAPORATED LAYERS IN RELATION TO PRODUCTION PARAMETERS Ph.D. Thesis [BESTIMMUNG DER ABSORPTIONSINDICES UND DER STRUKTUR DIELEKTRISCHER AUFDAMPFSCHICHTEN IN ABHAENGIGKEIT VON DEN HERSTELLUNGSPARAMETERN]
Harald Ahrens 1974 79 p refs In GERMAN
Avail: NTIS HC $4.75

Absorption-and scattering-losses of dielectric evaporated layer systems are determined by thermal resistance measurements. The specific effects of several parameters on absorption coefficients of various materials are determined for single layers, and the complex refraction index is used to calculate absorption values for multiple layer systems. Results show that the absorption index does not depend on layer thickness. Zinc sulfide possesses the lowest absorption index for high refractivity substances at k = 3x0,000001; the absorption index increases with increasing oxygen content. Transl. by G.G.

N75-13929# Monsanto Research Corp., Dayton, Ohio.
RESEARCH ON THE THERMOLYTIC DISSOCIATION OF MOLECULES Final Report, 1 Mar. 1972 - 31 Dec. 1973
William R. Feairheller, Jr., Mark D. Schumacher, and William D. Ross May 1974 67 p refs
(Contract F33615-72-C-1611; AF Proj. 7367)
(AD-784922; MRC-DA-422; AFML-TR-74-83) Avail: NTIS CSCL 07/3

A pyrolysis-gas chromatographic system assembled at Wright-Patterson Air Force Base and employed in the separations and identification of organic materials was provided with a data handling system to allow computer processing of the chromatographic results. In brief, the system separates a mixture into components and then pyrolyzes these components one at a time. The pyrolysis products are separated by two chromatographic systems and from their identity, the original compound can be identified. In this effort the data handling system was installed, checked-out and tested for reliability. The system provides the data in the form of a computer output giving the retention times, retention temperature and peak area. This system provides reliable and reproducible data for identification of organic compounds of interest to the Air Force Materials Laboratory.
Author (GRA)

24 COMPOSITE MATERIALS

Includes laminates.

N75-13930# Technische Universitaet, Hanover (West Germany).
STUDIES ON THE VARIATION IN WORK FUNCTION AND CONDUCTIVITY OF CARBON FILMS DURING ADSORPTION OF s- AND d-METALS Ph.D. Thesis [UNTERSUCHUNGEN UEBER DIE AENDERUNG DER AUSTRITTSARBEIT UND DER LEITFAEHIGKEIT VON KOHLENSTOFFILMEN BEI DER ADSORPTION VON S- UND D-METALLEN]
Herbert Schmidt 1973 92 p refs In GERMAN
Avail: NTIS HC $4.75

Interactions between evaporated carbon films and the d- and s-metals cobalt, nickel, copper, silver, gold, platinum and palladium were studied as function of metal adsorption. Conductivity- and work function-measurements show that at T = 77 k all metals registered a positive increase in conductivity. This effect is attributed to the semiconducting properties of carbon films and their surface chemisorption. Transl. by G.G.

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N75-13931# Technische Universitaet, Hanover (West Germany).
SOLUBLE FLUID SCINTILLATOR FOR BETA SPECTROMETRY AND GAMMA DOSIMETRY ON EVENLY DISTRIBUTED GAMMA SOURCES IN AQUEOUS SOLUTION Ph.D. Thesis [SOLUBILISIERTER FLUESSIGSZINTILLATOR ZUR BETA SPEKTROMETRIE UND GAMMA DOSIMETRIE GLEICHVERTEILTER GAMMA STRAHLER IN WAESSRIGEN LOESUNGEN]
Wilhelm Lahmann 1974 55 p refs In GERMAN
Avail: NTIS HC $4.25

Fluidic scintillation counter spectrometry of beta radiation sources in aqueous solution is studied by the following methods: (1) Cerenkov counters; (2) emulsoid scintillation counters; and (3) soluble scintillation counters. The introduction of a liquid toluole scintillator into a radioactive solution containing 75 vol/percent water produced high gamma rate measurements for an evenly distributed gamma source. Transl. by G.G.

N75-13932*# Battelle Columbus Labs., Ohio.
EVALUATION OF ELECTROCHEMICAL NITROGEN/HYDROGEN GAS SEPARATOR Final Report
J. E. Clifford and R. W. Sexton Nov. 1973 57 p
(Contract NAS2-7056)
(NASA-CR-137484) Avail: NTIS HC $4.75 CSCL 07D

An electrochemical nitrogen-hydrogen separator subsystem was investigated for use following catalytic dissociation of ammonia or hydrazine in a storage system being considered for long-duration manned space flight. An experimental cell with concentric tubular Pd-25Ag alloy hydrogen diffusion electrodes and hermetically sealed aqueous caustic electrolyte was developed. It was found that this cell operated satisfactorily at 210 C to 245 C and produced dry nitrogen and dry hydrogen with either or both gases at pressures up to 6.8 atmospheres (100 psia) or higher for storage. The final cell developed was operated satisfactorily for 176 days (4200 hours) with no evidence of deterioration of current-voltage performance. The best experimental performance was obtained at 245 C at currents up to 4 amperes (180 ma/sq cm and 360 ma/sq cm anode and cathode current densities, respectively) with a maximum steady-state cell voltage of 0.125 volt for an anode feed of pure hydrogen.
Author

N75-13933# California Univ., Berkeley. Lawrence Berkeley Lab.
CATALYTIC OXIDATION OF SO2 ON CARBON PARTICLES
T. Novakov and S. G. Chang Apr. 1974 19 p refs Presented at the 76th Natl. Am. Inst. of Chem. Meeting, Tulsa, Okla., 10-13 Mar. 1974 Sponsored by AEC
(Contract W-7405-eng-48)
(LBL-2693; Conf-740311-4) Avail: NTIS HC $3.25

The role of finely divided, high surface area soot particles in the oxidation of SO2 to sulfate is discussed. It was found that these particles are efficient and from the air pollution standpoint realistic catalyst for SO2 oxidation. The proposed oxidation mechanism is based on X-ray photoelectron spectroscopic (ESCA) measurements of ambient pollution particulates, on ESCA studies

of SO2 adsorption on activated charcoal, graphite and on propane soot particles. Author

N75-13934# California Univ., Los Angeles. Dept. of Chemistry.
PHOSPHORESCENCE-MICROWAVE MULTIPLE RESONANCE SPECTROSCOPY OF POLYATOMIC MOLECULES, PART 1 Annual Report, 15 Sep. 1973 - 14 Sep. 1974
M. A. El-Sayed May 1974 14 p ref
(Contract AT(04-3)-34)
(UCLA-34-P-91-71) Avail: NTIS HC $3.25

A summary of the research is presented, and the publications relating to this work are described. The research reported was in the following areas: (1) spin lattice relaxation between the zero-field levels; (2) mechanism of low temperature energy trapping; (3) magnetic circular dichroisms in the microwave region; and (4) theoretical investigation of the dipolar nature of the zero-field transitions. F.O.S.

N75-13935# Louisiana State Univ., Baton Rouge.
FAR ULTRAVIOLET RYDBERG SPECTRA OF METHYL AND MERCURIC HALIDES Ph.D. Thesis
P. H. Templet May 1974 124 p refs Sponsored by AEC
(TID-26580) Avail: NTIS HC $5.25

The energies of electronic transitions of the rare gases which exhibit a significant linear correlation at certain values were investigated. The corresponding correlation lines help to obtain the Rydberg transitions in simple halides and are used to identify the low-frequency Rydberg transitions in CH3X and HgX2 molecules where X = Cl, Br, I. An additional correlative technique was developed for the assignment of levels which derive from a configuration excitation and was applied to the lowest-energy Rydberg excitations of rare gases, hydrogen halides, alkyl halides, cyano halides, and acetylene halides. It was found that this verifies previous qualitative assignments, where such existed, and suggests a revision of the existing assignments for methyl chloride. Spectra are presented for CH3X, where X = Cl, Br, I in the far ultraviolet, and for HgX2, where X = Cl, Br, I in the near and far ultraviolet region. NSA

N75-13936# Ames Lab., Iowa.
ABSORPTION AND EMISSION MIXED CRYSTAL SPECTRA OF SOME AZAAZULENES M.S. Thesis
D. R. Eslinger Jul. 1974 112 p refs
(Contract W-7405-eng-82)
(IS-3222) Avail: NTIS HC $5.25

The lowest energy absorption system of both 2-chloro 1-monoazaazulene at 5300 A and 2-phenyl 1-monoazaazulene at 5600 A was assigned from mixed crystal polarization studies. The symmetry and oscillator strengths of these states clearly indicate a correspondence with the 7000 A state of azulene. A medium-independent breakdown of mirror symmetry between the absorption and fluorescence spectra is discussed. Polarization studies of the second state of chloroazaazulene and phenylazaazulene are consistent with the assignment for this state in both molecules. It was found that both molecules return to radiative normality since the observed fluorescence originates from the lowest singlet. Large deviations of the quest polarization ratios in certain mixed crystal systems and their relation to imperfect quest substitution were investigated. Author

N75-13937# Hahn-Meitner-Institut fuer Kernforschung, Berlin (West Germany).
PULSE RADIOLYSIS AND POLAROGRAPHY, A REVIEW
A. Henglein Jun. 1974 91 p refs
(HMI-B-148) Avail: AEC Depository Libraries HC $7.75

A critical review and analysis were made of recent studies on the initiation of polarographic currents in aqueous solutions of various organic and inorganic compounds and in a few organic solvents by a short pulse of 12-MeV electrons. The experimental arrangements at the Institute are described in detail. The kinetics of radical reactions are analyzed. The polarographic waves of radicals are considered theoretically. The polarograms and electrode reactions of various radicals are shown and discussed. The radicals considered are the hydroxyl radical and hydrogen atom, carboxyl radical, (SCN)2(-) and other inorganic radicals, alkyl radicals and radicals from long chain carboxylic acids, alcohol radicals, radicals with conjugated double bonds, alpha ether radicals, radicals from the addition of OH to aromatic compounds, radicals from amines and amides, chlorine-containing radicals, and oxyl and peroxyl radicals. NSA

N75-13938# Atomic Energy of Canada Ltd., Pinawa (Manitoba). Whiteshell Nuclear Research Establishment.
CHARACTERIZATION OF SUPPORTED METAL CATALYSTS BY GAS CHEMISORPTION IN A CONTINUOUS FLOW SYSTEM
A. G. Wikjord and W. P. Munson Mar. 1974 31 p refs Presented at the 56th Ann. CIC Meeting on the Effects of Surface Films on the Initiation of Stress Corrosion Cracking of Zircaloy-2, Montreal
(AECL-4667; Conf-730661-2) Avail: AEC Depository Libraries HC $4.75; Atomic Energy of Can., Ltd., Chalk River $1.00

A continuous flow system is described which uses a modified Perkin-Elmer Sorptometer with thermal conductivity detectors to measure chemisorption of gases on supported metal catalysts. Two methods, one based on a pulse adsorption procedure and the other on thermodesorption, were employed to estimate the adsorptive capacity of supported platinum and palladium catalysts. Hydrogen and carbon monoxide served as adsorbates. In some instances the results were compared to those obtained by the conventional static volumetric method. It was found that for precise quantitative work using the flow method, close attention must be given to detector calibration. The main advantage of the method is its speed of analysis; it offers a substantial saving of time in comparison to conventional measurements in static systems. Author (NSA)

N75-13939# California Univ., Los Angeles. Dept. of Chemistry.
LOW TEMPERATURE TRIPLET ENERGY TRAPS IN ORGANIC SOLIDS USING PHOSPHORESCENCE-MICROWAVE DOUBLE RESONANCE SPECTROSCOPY: MONOMER AND EXCIMER, PART 2 Ph.D. Thesis
C. T. Lin May 1974 307 p refs
(Contract AT(04-3)-34)
(UCLA-34-P-91-70) Avail: NTIS HC $9.25

Triplet energy traps at low temperatures (1.6 to 4.2 K) were studied for 1, 3, 5-trichlorobenzene and hexachlorobenzene in hexamethylbenzene host as well as in their own heat crystals. NSA

N75-13940# Oak Ridge National Lab., Tenn.
INFLUENCE OF GRAIN BOUNDARIES ON DEFORMATION AND FRACTURE OF METALLIC MATERIALS AT HIGH TEMPERATURE. 1: DEFORMATION
S. Ohta [1974] 20 p refs Transl. into ENGLISH from Zairyo (Japan), v. 23, no. 246, 1974 p 167-173 Sponsored by AEC
(ORNL-TR-2833) Avail: NTIS HC $3.25

The effects of crystal grain boundaries on deformations at high temperature due to creep and superplastic behavior were examined. It was found that the crystal grain boundary exerts large influence on high temperature deformation, particularly high temperature and low stress deformation, mainly through grain boundary slip. At the same time, grain boundary slip is important in that it has a controlling effect on high temperature fracture. There are still many uncertain areas in the elucidation of grain boundary slip, however, it is expected that studies involving direct observation of grain boundary dislocations will make clear the mechanism of grain boundary slip itself as well as the mechanisms that contribute to deformation and fracture. NSA

N75-13941# Oak Ridge Y-12 Plant, Tenn.
EFFECT OF CROSSLINKING ADDITIVES ON THE PROPERTIES OF CARBONS DERIVED FROM SELECTED PRECURSORS
O. J. Horne, B. Napier, Jr., and W. E. Smith 15 May 1974 44 p refs
(Contract W-7405-eng-26)
(Y-1933) Avail: NTIS HC $3.75

A study was made of the effect of various crosslinking additives on the properties of carbons derived from several precursors. Included in the group of additives were: furfurylideneindene, furfurylidenefluorene, p-xylylideneindene, p-xylylidenefluorene, pyromellitic dianyydride, H-resin Type 3, dicyclopentadiene, and norbornadiene. By blending one of these

additives with either a synthetic or commerical carbon precursor, a wide variety of carbon properties was obtained, thus affording avenues to control these properties by a controlled modification of the precursors. Author

N75-13942# Saint Cloud State Coll., Minn. Dept. of Chemistry.
GASEOUS METAL HYDROXIDES AT HIGH TEMPERATURES Final Report, period ending 15 Nov. 1973
J. H. Carpenter 1973 11 p refs Prepared for Calif. Univ., Livermore. Lawrence Livermore Lab.
(UCRL-13598) Avail: NTIS HC $3.25

Transport of metals and metal oxides as gaseous metal hydroxides constitutes an important practical problem in the dispersion of metals such as fission products to the environment. The gaseous metal hydroxide species that exist were studied, and their thermodynamic properties determined. A transpiration apparatus was set up and preliminary studies were done on lead transport. Flow rate conditions were determined at which saturation of the carrier gas steam was complete and diffusion of the volatile species was minimized. Assuming that the gaseous species is Pb(OH)2 an equilibrium constant was found for the reaction: PbO(s) + H2O(g) = Pb(OH)2(g) at 973 K. Using the above data the enthalpy of dissociation of Pb(OH)2(g) to Pb(g) and 2OH(g) at 298 K is 135 kcal/mole. Determination of the vapor species using the present apparatus appears to be impractical because of the small amount of lead transport that can be obtained. Alternative methods should be explored. Author (NSA)

N75-13943# Battelle-Northwest, Richland, Wash.
RATE CONSTANTS FOR THE REACTION OF CARBON DIOXIDE AND WATER VAPOR WITH KC GRAPHITE
R. C. Gilberson [1967] 13 p refs
(Contract AT(45-1)-1830)
(BNWL-CC-1381) Avail: NTIS HC $3.25

Rate constants for the C + CO2 reaction and the C + H2O reaction are presented for KC graphite. The inhibiting effect of CO and H2 on the CO2 and H2O reactions, respectively, is also shown. KC graphite is found to oxidize about three times as fast as TSX graphite for the CO2 reaction and about equal to TSX graphite for the H2O reaction. Author (NSA)

N75-13944# Institutt for Atomenergi, Kjeller (Norway).
ELECTROCHEMISTRY OF UNIFORM CORROSION AND PITTING OF ALUMINIUM
K. Videm 1974 82 p refs
(KR-149) Avail: AEC Depository Libraries HC $7.25

Pitting corrosion of aluminum was investigated as a function of the chloride concentration in electrolytes, and the field strength during barrier layer anodizing. It was found: (1) chloride additions to the electrolyte increase pitting attack; (2) chloride promotes pitting by inhibiting the repair of local defects; (3) a break-down event leads to a burst of A1 ions which combine faster with chloride than the dissolution, and (4) when pitting has started, a new type of chloride bearing oxide is formed. F.O.S.

N75-13945# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
THEORY OF INFRARED ABSORPTION WITH SPIN WAVE EXCITATION IN ALPHA OXYGEN
Yu. B. Gaididei and V. M. Loktev 1974 29 p refs In RUSSIAN
(ITF-74-45P) Avail: AEC Depository Libraries HC $4.50

The spin wave spectrum of the antiferromagnetic phase of solid oxygen was investigated. The equilibrium spin configurations of alpha oxygen were calculated both in the absence and presence of an external magnetic field of arbitrary magnitude, and expressions for the energies of spin waves over the entire range of magnetic fields obtained. It is shown that the branches of antiferromagnetic resonance can intersect when the field directed along the main (monoclinic) axis of a crystal increases. The polarization dependence of the antiferromagnetic resonance lines were considered and their intensities were investigated. Author

N75-13946# United Kingdom Atomic Energy Authority, Harwell (England).
CHEK AND CHEKMAT: TWO CHEMICAL REACTION KINETICS PROGRAMS
A. R. Curtis and E. M. Chance May 1974 68 p refs
(AERE-R-7345) Avail: AEC Depository Libraries HC $6.50; UK £1.50

Program CHEK simulates chemical reaction kinetics in stirred solution economically on an IBM System/360 or 370 computer. Program CHEKMAT simulates chemical reaction kinetics with matching of observed data by automatically fitting selected rate constants. Input data is prepared in a natural, free-format language, and the user need not be concerned with numerical difficulties. Information is given on preparation of data for both programs, on the methods used in them and (for the more demanding user) on how to modify their action by supplying subroutines of his own. Examples are included. Author

N75-13947# Technological Lab. RVO-TNO, Rijswijk (Netherlands).
INVESTIGATION OF THE POSSIBLE CAUSE OF TWO EXPLOSIONS IN OXYGEN TUBES [ONDERZOEK NAAR DE MOGELIJKE OORZAAK VAN EEN TWEETAL EXPLOSIES IN ZUURSTOFSLANGEN]
28 Mar. 1974 12 p In DUTCH
(Contracts G-4047; A74/Klu-012)
(TL-1974-8; TDCK-64323) Avail: NTIS HC $3.25

After two explosions in the oxygen tubes of oxygen supply tank trucks, the possible causes of these explosions were investigated. The explosions occurred immediately after opening the oxygen cylinders. The interior of the tubes was examined, and no organic material was found. Some small holes were found near the rupture, which could have resulted from bending metal fatigue. It is suggested the present tubes be replaced by other types with a teflon interior, or copper pipes, and a filter be placed in the tube. ESRO

N75-13948# Chemical Lab. RVO-TNO, Rijswikj (Netherlands).
THE GENERATION OF HYDROGEN FOR FILLING METEO-BALLOONS
A. E. T. Kuiper Jun. 1974 12 p In DUTCH; ENGLISH summary
(Contract A74/KL/011)
(CL-1974-6; TDCK-64982) Avail: NTIS HC $3.25

Means of improving the generation of hydrogen gas from the reaction between silicon and sodium hydroxide in a reaction vessel were investigated. The present reaction has a slow start and, as a result, the temperature in the vessel remains low and the reaction rate is too low to produce a sufficient quantity of hydrogen in a reasonable time. Improvements were obtained by applying preheated reagens, increasing the contact area between silicon and sodium hydroxide, and initiating the reaction by using finely dispersed silicon. Although the procedure, including the modifications, migbt be used, a search for better solutions is proposed. ESRO

N75-13949# Technology, Inc., Dayton, Ohio.
NUMERICAL CALCULATIONS OF UV EMISSION AND ABSORPTION SPECTRA OF OH Final Report, 1 Mar. 1972 - 1 Mar. 1973
Michael E. Neer Aug. 1974 147 p refs
(Contract F33615-71-C-1463; AF Proj. 7065)
(AD-786021; ARL-74-0109) Avail: NTIS CSCL 07/4

The report presents the details and uses of a computer program designed to predict the ultraviolet emission and absorption spectra of OH associated with combustor flowfields. The intended purpose of the computer program is to facilitate the development of spectroscopic diagnostic techniques for specific application to supersonic mixing and combustion. The mathematical models used to represent the emitting and absorbing gas are given. Geometry and apparatus considerations are discussed, as well as calibration procedures. The computation scheme is outlined including the basic modes of operation, and the manner in which input data are submitted is explained. The various uses of the computer program are demonstrated and comparisons are made with experimental spectra. Two graphical inversion techniques are also presented, one of which can be used to obtain radial profiles of temperature and OH number density from an axisymmetric combustor flowfield. A

listing of the computer program and a partial printout are included. GRA

N75-13950# New Mexico Univ., Albuquerque.
COMPUTER CODE FOR COMPLEX CHEMICAL EQUILIBRIUM STUDIES AT ELEVATED TEMPERATURES AND PRESSURES Final Report, Aug. 1972 - May 1973
William T. Ristau and Robert S. Pritchard Aug. 1974 133 p refs
(Contract F29601-72-C-0024)
(AD-784867; AFWL-TR-73-225) Avail: NTIS CSCL 07/4

Prediction of the chemical composition of reaction mixtures from pyrolysis reactions and combustion processes can be made through the use of thermodynamics. The chemical equilibrium section of a code for predicting rocket performance was modified for use on a CDC-6600 computer to calculate the chemical equilibrium composition of complex mixtures of hydrocarbons as a function of temperature and pressure. Ancilliary codes supplying the necessary thermodynamic information for the equilibrium calculation are included. Thermodynamic parameters of selected complex molecules up to and including substituted benzenes are included. Results for hydrogen and methane in air are reported. (Modified author abstract) GRA

N75-13951# Little (Arthur D.), Inc., Cambridge, Mass.
STUDY, DESIGN AND FABRICATE A COLD CRUCIBLE SYSTEM
Joseph F. Wenckus, Martin L. Cohen, Alfred G. Emslie, Wilson P. Menashi, and Peter F. Strong 15 May 1974 54 p
(Contract F19628-74-C-0097; AF Proj. 5620)
(AD-786481; AFCRL-TR-74-0314; SR-1) Avail: NTIS CSCL 20/2

The objective of this program is to conduct a study, design and fabricate a cold crucible system for the synthesis and Czochralski crystal growth of refractory semiconductors and oxides. During the first 6 months a theoretical analysis of the cold crucible relating the properties of the material to the electrical characteristics of the cold crucible has been essentially completed. The thermal analysis, which includes thermal modeling by means of a computer technique, has also been completed. An initial detailed analysis of the RF power control system necessary to provide the desired stability for crystal growth has been completed. The design of a cold crucible assembly suitable for the growth or refractory oxide crystals has been completed. It is a simple, rugged, modular assembly which will be readily adaptable in the future to a controlled-atmosphere furnace system. (Modified author abstract) GRA

N75-13952# Army Foreign Science and Technology Center, Charlottesville, Va.
COMBUSTION OF MIXTURES OF METAL SULFATES WITH MAGNESIUM OR ALUMINUM
A. V. Vasilev, V. V. Gorbunov, and A. A. Shivlovskii 19 Nov. 1973 7 p refs Transl. into ENGLISH from Fiz. Goreniya Vzryva (U.S.S.R.), 1971 p 150-152
(AD-785988; FSTC-HT-23-1304-73) Avail: NTIS CSCL 21/2

Data are presented on heat of combustion, critical particle size and rates of combustion of Mg Al mixtures with various sulfates and hydrated sulfates. Mixtures with compounds not decomposing at melting temperature burn at rates independent of pressure, with combustion apparently taking place mainly in the condensed phase. The other group, decomposing at or below melting temperature, burn more rapidly as pressure rises, with combustion apparently taking place mainly in the gas phase. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N75-13953 + Engineering Sciences Data Unit, London (England).
THE EFFECT OF SURFACE ROUGHNESS ON THE FATIGUE LIMIT OF STEELS (AT ZERO MEAN STRESS)
Oct. 1974 17 p refs Sponsored by Roy. Aeron. Soc. and Inst. of Mech. Engr.
(ESDU-74027) Copyright. Avail: NTIS HC $74.50

Data are provided on the zero mean stress fatigue limit of steels having rough surfaces. The peak-to-valley height measurements are used for the description of surface roughness. The center line-average height measure method is also described. The data is applicable to rotating or reciprocation machine parts such as electric motors, pumps, internal combustion engines, and machine tools. Author

N75-13954# Centre d'Information du Cobalt, Brussels (Belgium).
COBALT-CONTAINING HIGH-STRENGTH STEELS: A CRITICAL REVIEW OF THE PHYSICAL METALLURGY OF COBALT-CONTAINING HIGH-STRENGTH STEELS, AND A SURVEY OF THEIR PROCESSING, PROPERTIES AND USES
A. Magnee, J. M. Drapier, J. Dumont, D. Coutsouradis, and L. Habraken 1974 137 p refs
Avail: NTIS HC $5.75

A survey of existing and developmental cobalt-containing high-strength steels, and the role of cobalt in these steels is examined. The hardening mechanisms in high-strength steels are discussed along with carbide-strengthened steels such as 9Ni-4Co and 10Ni-8Co-Cr-Mo types. Maraging steels are also described. F.O.S.

N75-13955# Technische Universitaet, Munich (West Germany).
Re-NQR STUDIES ON ALLOYS OF THE HEPTAVALENT RHENIUM Ph.D. Thesis [RE-NQR-UNTERSUCHUNGEN AN VERBINDUNGEN DES SIEBENWERTIGEN RHENIUMS]
Max-Ferdinand Eckel 20 Jun. 1974 86 p refs In GERMAN
Avail: NTIS HC $4.75

Nuclear quadrupole resonance measurements on ReO4 tetrahedron structures are reported for perrhenates with Scheelit lattices that leave oxygen ligands with one, resp. two strongly deformed ReO6 octahedrons in the compounds Re2O7(OH)2, resp. Re2O7. Studied are the effects of cations on the ReO4(-) anion, the effect of hydrogen liquid formation on NQR coupling constants and coupling frequencies, the different oxygen ligands, and the abnormal temperature dependences for a large temperature region. Transl. by G.G.

N75-13956# Technische Universitaet, Hanover (West Germany).
ON THE DETERMINATION OF SMALL SULFUR AMOUNTS IN SILVER, COPPER, GOLD AND PLATINUM Ph.D. Thesis [UEBER DIE BESTIMMUNG KLEINER SCHWEFELGEHALTE IN SILBER, KUPFER, GOLD UND PLATIN]
Allard V. Kameke 1974 161 p refs In GERMAN
Avail: NTIS HC $6.25

A hot extraction procedure and a solvent distillation method are reported for the quantitative determination of sulfur traces in silver, copper, gold and platinum. The first method extracts sulfur from the heated silver as hydrogen sulfide, through a hydrogen current and the second method dissolves the silver in acidic hydrogen iodide for developing hydrogen sulfide determination in a zinc acetate solution. Transl. by G.G.

N75-13957# Technische Universitaet, Hanover (West Germany).
APPLICATION OF LIGHT ARC ENERGY FOR PRODUCING LEAD ALLOYS Ph.D. Thesis [ANWENDUNG DER LICHT BOGENENERGIE ZUR HERSTELLUNG VON BLEI-LEGIERUNGEN]
Yvan Houbaert 1973 241 p refs In GERMAN
Avail: NTIS HC $7.50

The use of a thermal plasma jet for the preparation of lead alloys is reported. The procedure fuses high melting point alloys into liquid lead flow through reactions of the finely dispersed particles. Lead alloying experiments with iron, copper, aluminum, nickel and tungsten are described. Transl. by G.G.

N75-13958# Royal Aircraft Establishment, Farnborough (England).
A STUDY OF THERMOMECHANICAL TREATMENTS FOR THE ALLOY Ti-6Al-4V
B. deGelas, L. Seraphin, R. Tricot, and R. Castro Nov. 1974 24 p refs Transl. into ENGLISH from Rev. Met. (Paris), v. 71, no. 1, 1974 p 51-61
(RAE-Lib-Trans-1798; BR44473) Avail: NTIS HC $3.25

Ti-6Al-4V alloy microstructures produced by thermomechani-

cal treatment under closely controlled conditions in the laboratory were studied using optical microscopy and the X-ray back reflection technique. The alloy was deformed by tension and compression in the alpha + beta and beta fields and the deformation required to produce acceptable refinement in both fields was defined. Fine microstructures were produced by deformation in the beta field but these were always acicular whatever the operating conditions. Rapid recrystallization occurred in the beta field as soon as there was no applied deformation, and it was suggested that forging in this field would require a minimum holding time at temperature without deformation, and a quench immediately after deformation. Author

N75-13959# Los Alamos Scientific Lab., N.Mex.
HIGH RATE PHYSICAL VAPOR DEPOSITION OF REFRACTORY METALS
Max A. Sherman, Rointan F. Bunshah, and Harry A. Beale 1973 39 p refs Presented at the Vacuum Metallurgy Conf., Pittsburgh, 17 Jun. 1974 Sponsored by AEC
(LA-UR-74-937; Conf-740645-1) Avail: NTIS HC $3.75

Foils of Mo, TZM, Nb, and V were produced using high rate physical vapor deposition (HRPVD) techniques on substrates of the same materials. All four were condensed at 0.37 of their melting temperatures Tm, with Mo further studied from 0.23 to 0.44 Tm and TZM from approximately 0.2 to 0.39 Tm. Deposits were characterized by grain size and morphology, yield strength, impurity content, hardness, bend ductility, and additionally for Mo the lattice parameter and tensile strength. The Mo condensed epitaxially on Mo substrates between 600 and 900 C. The TZM condensed in a columnar grain morphology with a fibrous substructure, and Nb in an equiaxed structure. Yield strengths of Mo and Nb were comparable to those of conventionally prepared material for equivalent grain sizes. The TZM exhibited no mechanical strength due to oxygen contamination during deposition. An average yield strength of 36.1 kg/sq mm was obtained in V deposits of 0.69 microns grain size. The possibility of suppressing void formation and growth in fast-neutron irradiated fine grained materials produced by HRPVD is discussed. Author (NSA)

N75-13960# Kernforschungszentrum, Karlsruhe (West Germany).
STRUCTURES, PREPARATION, AND PROPERTIES OF REFRACTORY COMPOUNDS AND SYSTEMS
H. Holleck and C. Thuémmler Apr. 1974 70 p refs In GERMAN; ENGLISH abstract
(KFK-EXT-6/74-2) Avail: AEC Depository Libraries HC $6.50

Reports concerning investigations of TaC bearing refractory compounds and systems are summarized. Papers dealing with the preparation and properties of MoC sub I-x and WC sub I-x bearing carbide mixed phases, and with X-ray measurements on reactions of Hf-carbonitrides involving the carbide-phase and the binder metal are included. Thermodynamic and analytical aspects are discussed. Author (NSA)

N75-13961# Illinois Univ., Urbana.
STUDY OF PRECIPITATION IN COPPER PLUS 13 ATOMIC PERCENT BERYLLIUM BY NUCLEAR MAGNETIC RESONANCE AND FIELD ION MICROSCOPY Ph.D. Thesis
A. C. C. Yen Jun. 1974 126 p refs
(Contract AT(11-1)-1198)
(COO-1198-1073) Avail: NTIS HC $5.75

Precipitation in a copper-beryllium alloy was studied by means of nuclear magnetic resonance and field ion microscopy. The wipe-out number describing the copper resonance amplitude for the alpha solid solution is found to be 18 for the central transition. Aging data are obtained for Cu + 13 at. % Be at different temperatures. An apparent equilibrium composition of the alpha-matrix at various temperatures was evaluated from the NMR absorption intensity in the completely precipitated state. A deviation from the beryllium solvus boundary is observed and found to be a temperature (aging) dependent quantity. A field ion microscope was constructed and various conditions of image gas composition and pressure were tried for imaging pure copper and Cu + 13 at. % Be. A thin layer of copper atoms around each precipitate particle is excluded from the observed NMR absorption intensity because of local lattice and electronic effects. Small precipitate particles embedded in the alpha-matrix cause a shift in the equilibrium beryllium concentration in the alpha-phase. Results from this experiment together with the Thomson-Freundlich equation are used to estimate the interface energy. The Knight shift of CuBe is measured and its value is found to be close to that of CuZn. Author (NSA)

NN75-13962# Oak Ridge National Lab., Tenn.
THERMODYNAMICS OF PRECIPITATION REACTIONS IN TITANIUM-MODIFIED STAINLESS STEEL
J. M. Leitnaker and R. E. Gehlbach Jul. 1974 21 p refs
(Contract W-7405-eng-26)
(ORNL-TM-4543) Avail: NTIS HC $3.25

Titanium added to stainless steel causes sulfur to precipitate as Ti4C2S2, nitrogen as Ti(C,N), and some carbon as TiC. The molar activity coefficient of titanium at 1050 C is calculated to be 0.070 at 0.00203 mole fraction titanium. The heat of formation of TiS bound as Ti4C2S2 is calculated to be < -79 kcal/mole. NSA

N75-13963# Sandia Labs., Livermore, Calif.
EFFECTS OF SURFACE OXIDES ON THE PERMEATION OF DEUTERIUM THROUGH 309S STAINLESS STEEL
W. A. Swansiger, R. G. Musket, L. J. Weirick, and W. Bauer Jun. 1974 31 p refs
(Contract AT(29-1)-789)
(SLL-74-0208) Avail: NTIS HC $3.75

Results from deuterium permeation through 309S stainless steel were combined with oxide growth and surface characterization information in an effort to understand the effects that surface oxides have on the permeation. Permeation results for 0.25 mm thick diaphragms were obtained using an all-metal, ion pumped vacuum system and a quadrupole mass spectrometer. The temperature range covered was 250 to 450C with an upstream deuterium pressure of 100 torr. Analysis by sputter-through-Auger electron spectroscopy (AES) revealed that some oxides were reduced or altered by the permeation process. The study included oxide thicknesses of 100 to 2500 A grown by various procedures. Other characterization techniques employed were proton-induced X-ray spectroscopy (PIX), scanning electron microscopy (SEM), and transmission electron microscopy (TEM). Most of the oxides studied were found to have little effect on the deuterium permeability. Those oxides formed in air at 360C temporarily lowered permeation rates by a factor of ten, but the effect gradually disappeared as the oxide was reduced by permeating deuterium. Author

N75-13964# Deutsche Edelstahlwerke A.G., Krefeld (West Germany). Abteilung Pulvermetallurgie.
DEVELOPMENT OF A PROCESS FOR THE MANUFACTURE OF P/M HIGH-TEMPERATURE SUPERALLOYS [ENTWICKLUNG EINES VERFAHRENS ZUM HERSTELLEN HOCHWARMFESTER WERKSTOFFE AUF PULVERMETALLURGISCHEM WEGE]
Otto Schmidt, Elisabeth Horn, and Florian Schubert Bonn Bundesmin. fuer Forch. und Technol. Oct. 1974 159 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forch. und Technol.
(BMFT-FB-T-74-26) Avail: NTIS HC $6.25; ZLDI, Munich 33 DM

Using both prealloyed and simply blended powders, P/M high temperature sample material was produced from grades Inconel 713 C, Udimet 700, and CoCr 2o Ni 2o W (similar to ATS 113) by means of the following manufacturing processes: cold compacting and sintering; hot die pressing; hot extrusion. The different steps for producing the material were supplemented by thermal and thermomechanical treatments. Compared with conventionally produced material, hot extrusion of low-oxygen powders and thermal or thermomechanical post-treatments resulted in material with improved mechanical and technological properties for test temperatures of up to 750 to 800 C. It is therefore suggested that structural parts for application in the temperature range concerned, such as jet engine discs, hubs, rings, and spacers, can be successfully produced by the above mentioned P/M-processes under economically favorable conditions. Author (ESRO)

N75-13965# Vereinigte Aluminium-Werke A.G., Bonn (West Germany).
DEVELOPMENT OF A TECHNICAL PROCESS FOR THE

PRODUCTION OF HIGH PURITY ALUMINUM FOR CRYOELECTRIC ENGINEERING PARTICULARLY FOR CRYOMAGNETS [ENTWICKLUNG EINES TECHNISCHEN VERFAHRENS ZUR HERSTELLUNG VON REINSTALUMINIUM FUER DIE KRYOELEKTROTECHNIK, SPEZIELL FUER KRYOMAGNETE]

Wolf-Dieter Hannibal, Gerhard Ibe, Kurt Kurre, H. Peychal-Heiling, Heimar Udo Pfundt, Wolfgang Reuter, Guenther Scharf, and Guenter Winkhaus Bundesmin. fuer Forsch. und Technol. Oct. 1974 39 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-31) Avail: NTIS HC $3.25; ZLDI, Munich 8, 20 DM

High aluminum purity grades were obtained in a pilot plant with a capacity of 1 to 2 tons Al per year using metalorganic electrolysis and zone melting techniques: conventional purity 99.999, greater than 99.9995% Al; electrical resistivity ratio 6000 to 15000 for 0.3 mm samples and electrical resistivity bulk ratio 8000 to 45,000. The refined material could be worked into thin strip without considerable loss of purity. It was possible to insulate the strip by anodic oxidation, to join strip pieces by electron beam welding, and to produce thin wire from high purity aluminum. ESRO

N75-13966# Ecole Nationale Superieure de Techniques Avancees, Paris (France). Lab. Materiaux-Structures.

EFFECT OF MICROSTRUCTURAL STATE ON DUCTILITY AND RUPTURING BEHAVIOR OF THE TITANIUM ALLOY TA6V [INCIDENCES DE L'ETAT MICROSTRUCTURAL SUR LA DUCTILITE ET LE COMPORTEMENT A LA RUPTURE DE L'ALLIAGE DE TITANE TA6V]

B. HadjSassi, P. Quoix, and P. Lehr 1974 31 p refs In FRENCH Prepared jointly with CNRS

(Rept-038) Avail: NTIS HC $3.75

The ductility and rupturing behaviors of the titanium alloy TA6V resulting from thermal and thermomechanical treatment are described as a function of the microstructure of the alloy. The following treatments were studied: annealing in the alpha + beta domain at different temperatures after cold rolling; microhardness of the hot rolled alloy in the alpha + beta domain as a function of the annealing temperature; mechanical characteristics as a function of the temperature of maintaining the alpha + beta domain after homogenizing in the beta phase; and mechanical characteristics as a function of the temperature of changing to the alpha + beta domain after dipping during the beta phase. ESRO

N75-13967# Battelle Columbus Labs., Ohio.

RESEARCH ON METALLURGICAL SYNTHESIS Final Report

B. A. Wilcox, G. T. Hahn, and R. I. Jaffee Jan. 1974 229 p refs

(Contract F33615-71-C-1679; AF Proj. 62102F)

(AD-781133/4; AFML-TR-73-238-Pt-2) Avail: NTIS HC $7.50 CSCL 11/6

The research program consists of various tasks on metallurgical synthesis, which are aimed at developing improved microstructures in metals and ceramics. The tasks are considered 'next stop' research, in that prior critical experiments have demonstrated the feasibility of a concept. The research was aimed at developing the potential usefulness of the basic concept, and to determine the circumstances under which it might be expected to operate. The tasks discussed in this report deal chiefly with research on aluminum and titanium alloys, and to a lesser extent with ceramics. (Modified author abstract) GRA

N75-13968# Army Foreign Science and Technology Center, Charlottesville, Va.

ALUMINUM ALLOYS WITH A HIGH CONTENT OF HIGH-MELTING METALS

V. I. Dobatkin, V. I. Elagin, and F. M. Fedorov May 1974 14 p refs Transl. into ENGLISH from the book "Metalloved. Tsvet. Splavov." Moscow, Nauka, 1972 p 163-169

(AD-786805; FSTC-HT-23-0710-74) Avail: NTIS CSCL 11/6

Up until recently it has been impossible to use more than small (less than 2%) amounts of high-melting metals in aluminum alloys. The use of high-melting components gives the alloy a number of valuable properties. Because coarse primary crystals of intermetallic compounds form in the alloys it is difficult to produce high-quality ingots. The article discusses new methods of producing such ingots--by increasing casting temperatures and decreasing the size of the ingots. Granulation of the melt and treatment of the granules under pressure is a radical new solution and the results of research in this field are presented. GRA

N75-13969# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.

SOLID CADMIUM EMBRITTLEMENT OF 4340 STEEL

James A. Hoffner 27 Jun. 1974 16 p refs

(AD-786378; NADC-74072-30) Avail: NTIS CSCL 11/6

High strength AISI 4340 steel heat treated to 210-220 ksi UTS was observed to suffer degraded ductility when exposed to solid cadmium. The critical criteria include effective tensile strain parallel to the Cd/steel interface and intimate Cd/steel contact (oxide free). At moderate temperatures (300 F) exposure for extended periods (100 hrs) is required to produce the embrittlement effect. The most severe of the test conditions employed in this study produced evidence that intergranular slow growth cracking could occur, resulting in deteriorated load bearing capacity of the material. Author (GRA)

N75-13970# Washington Univ., Seattle. Dept. of Mechanical Engineering.

AN INVESTIGATION ON THE PLASTICITY MAGNIFICATION FACTOR IN DEEP SURFACE FLAWS Final Report

Albert S. Kobayashi Aug. 1974 8 p

(Grant DA-ARO(D)-31-124-73-G38)

(AD-786661; AROD-10100.4-E; FR-4) Avail: NTIS CSCL 11/6

The research program consisted of the following two initially independent analyses: (a) elastic analysis of surface flaws, and (b) elastic-plastic analysis by two-dimension finite element analyses. GRA

N75-13971# Rensselaer Polytechnic Inst., Troy, N.Y. Materials Div.

MICROSTRUCTURAL CHARACTERIZATION AND STRESS CORROSION CRACKING SUSCEPTIBILITY OF Al-Zn-Mg-Ti ALLOYS

C. Chen and Gary Judd Sep. 1974 20 p refs

(Contract N00014-67-A-0117-0009)

(AD-785907; TR-6) Avail: NTIS CSCL 11/6

The effects of adding small amounts of titanium to age-hardening Al-Zn-Mg alloys have been studied by transmission electron microscopy, mechanical atests, and stress corrosion cracking (SCC) tests. The zinc, magnesium, and titanium content of the alloys was varied and the effect of aging upon these alloys was examined. Multiple stages of aging were observed for several of the titanium addition alloys. The resistance to SCC of the Al-Zn-Mg ternary in an aqueous solution (3.5%NaCl) at room temperature was significantly improved in the titanium addition alloy with 0.12% as compared to an alloy with 0.23% Ti reported upon previously. The addition of 0.09%Ti to Al-7%Zn-2%Mg alloy produces a finer grain boundary precipitation and no deleterious effect on the SCC property. Author (GRA)

N75-13972# Northeastern Univ., Boston, Mass. Solid State Chemistry Lab.

DEVELOPMENT AND TESTING OF CONTINUOUS-QUENCHING AND CONSOLIDATION TECHNIQUES FOR THE BULK PRODUCTION OF METASTABLE ALLOYS Final Report

B. C. Giessen 6 Sep. 1974 10 p refs

(Contract N00014-68-A-0207-0006; NR Proj. 031-758)

(AD-785915; N14-68-A-207-6-2) Avail: NTIS CSCL 11/6

The design, construction and testing of a splat cooling unit based on a plasma gun are discussed, as well as studies on the production and processing of bulk quantities of amorphous Cu-Zr alloys prepared with this unit. Author (GRA)

N75-13973# Bureau of Mines, Albany, Oreg. Metallurgy Research Center.

REDUCING SURFACE HOT SHORTNESS OF COPPER-CONTAINING STEELS USING SILICON ADDITIONS AND CONTROLLED REHEATING CONDITIONS

Mark I. Copeland Aug. 1974 25 p refs

(PB-236269/7; BM-RI-7936) Avail: NTIS HC $3.25 CSCL 11F

A study was conducted to determine the effect of steel reheating practices in burning natural gas on the amount of silicon required to prevent the formation of copper on steels containing up to 1 wt-pct Cu. Formation of copper, which causes surface hot shortness, was readily prevented by as little as 0.3 wt-pct Si and by 2 vol-pct excess oxygen in the furnace atmosphere when reheating steel containing up to 0.8 wt-pct Cu. The Bureau of Mines sponsored this research effort to improve the recycling capability of copper-containing scrap steels by eliminating the major drawback to their use, the formation of surface cracks during hot working. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N75-13974*# United Aircraft Corp., East Hartford, Conn. Research Labs.

INVESTIGATION TO DEVELOP A METHOD TO APPLY DIFFUSION BARRIER TO HIGH STRENGTH FIBERS

Contract Report, Sep. 1973 - Aug. 1974

Richard D. Veltri, Richard D. Paradis, and F. C. Douglas Jan. 1975 84 p refs

(Contract NAS3-17757)

(NASA-CR-134719) Avail: NTIS HC $4.75 CSCL 11E

A radio frequency powered ion plating process was used to apply the diffusion barriers of aluminum oxide, yttrium oxide, hafnium oxide and titanium carbide to a substrate tungsten fiber. Each of the coatings was examined as to its effect on both room temperature strength and tensile strength of the base tungsten fiber. The coated fibers were then overcoated with a nickel alloy to become single cell diffusion couples. These diffusion couples were exposed to 1093 C for 24 hours, cycled between room temperature and 1093 C, and given a thermal anneal for 100 hours at 1200 C. Tensile testing and metallographic examinations determined that the hafnium oxide coating produced the best high temperature diffusion barrier for tungsten of the four coatings. Author

N75-13975# Society of the Plastics Industry, Inc., Laguna Beach, Calif.

THE WIDE WORLD OF PLASTIC TOOLING

Apr. 1974 66 p refs Presented at 8th Ann. Western Plastics for Tooling Conf., San Diego, Calif., 3-6 Apr. 1974; sponsored in part by Plastics for Tooling Group and San Diego State Univ. Avail: NTIS HC $4.25

The proceedings of a conference on the applications of plastics for tooling operations are presented. The subjects discussed include the following: (1) resin application equipment, (2) urethanes and elastomers for tooling, (3) basics of plastic tooling, (4) advanced tooling techniques using a thermoplastic compound, and (5) applications of a curved surface in structural engineering. For individual titles, see N75-13976 through N75-13984.

N75-13976 Venus Products, Inc., Kent, Wash.

RESIN APPLICATION EQUIPMENT

Robert J. MacDonnell *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 1-4 (For availability see N75-13975 05-27)

The development of hydraulic injection and mixing of catalyst internally, under pressure, with a balanced system of high ratio pumps, has allowed the development of mechanical application equipment. This equipment is capable of economical handling and converting of material in the open mold laminating process. Casting systems, as well as spray systems, can be considered in the mechanized process. Large volume markets are being developed as a result of advanced methods of handling and converting with these more competitive processing techniques. Author

N75-13977 Dexter Corp., City of Industry, Calif. Hysol Div.

URETHANES, ELASTOMERS FOR TOOLING

William M. Ryan *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 5-8 refs (For availability see N75-13975 05-27)

The chemical composition and properties of urethanes and elastomers are discussed. Laboratory tests of the materials are described. The procedures for measuring various mechanical properties are explained. Safety considerations involved in working with plastic materials are reported. Author

N75-13978 Society of the Plastics Industry, Inc., Laguna Beach, Calif.

FT. CARSON INVOLVEMENT IN PLASTICS AT THE TRAINING AID CENTER

Robert C. Schuetz *In its* The Wide World of Plastic Tooling Apr. 1974 p 9-11 (For availability see N75-13975 05-27)

Procedures used for tooling of plastic materials for the development of training aids by military organizations are discussed. The specific plastics used for the training devices are identified. The use of vacuum forming principles is stressed. The physical and mechanical properties of several plastic materials are examined. Author

N75-13979 Furane Plastics, Inc., Los Angeles, Calif.

HT EPOXY TOOLING RESINS WITH IMPROVED HANDLING SAFETY CHARACTERISTICS

Wm. Romey *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 14-17 (For availability see N75-13975 05-27)

The physical and mechanical properties of a low toxicity, high temperature resin systems are discussed. The procedures for handling and forming the materials are explained. The applications of the materials are identified. The handling characteristics and physical properties of the materials are summarized in tabular form. Author

N75-13980 CIBA-GEIGY (UK) Ltd., Cambridge (England). Ren Plastics Div.

BASICS OF PLASTIC TOOLING

L. E. Winter *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 18-20 (For availability see N75-13975 05-27)

The methods for tool fabrication using fiberglass reinforcement and various plastic materials are discussed. The mechanical properties of the laminates are described to show their adaptability to tool formation. The characteristics of cast tools are examined. Methods for preparing and applying the resin material to achieve the final form are explained. Author

N75-13981 Kimstock, Inc., Santa Ana, Calif.

QUALITY CONTROL AND PRODUCT DESIGN IN A HIGH-VOLUME FRP MANUFACTURING PLANT

William E. Clow *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 21-22 (For availability see N75-13975 05-27)

The operations of an industry which manufactures plumbing fixtures using fiberglass and epoxy resins are discussed. The physical and mechanical properties of the materials are defined to show the need for high standards. The quality control tests of the finished product are described. Author

N75-13982 Society of the Plastics Industry, Inc., Laguna Beach, Calif.

RESINS SCARCE? MAKE TOOLS AND PARTS WITH SOLID WASTE AND CONGLOMERATE-COMPOSITES

Edwin F. Bushman and Bruce E. Bushman *In its* The Wide World of Plastic Tooling Apr. 1974 p 23-36 refs (For availability see N75-13975 05-27)

This paper suggests ways the scarce resins may be combined with readily available solid aggregates, fines and powders, to make useful solid molds or products. Low density and biodegradable organic agricultural wastes and products, solid metallic and nonmetallic wastes, and discarded materials of construction and industry are shown to have use in making inexpensive and serviceable conglomerate composite tools and parts. Types and sources of solid and low density wastes for plastics uses are discussed, along with ecological benefits. Author

N75-13983 Douglas Aircraft Co., Inc., Long Beach, Calif.
ADVANCED TOOLING TECHNIQUES USING A THERMOPLASTIC COMPOUND
Arthur R. Gomez *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 37-44 (For availability see N75-13975 05-27)

A manufacturing process using a plastic material of specific composition in an attempt to reduce machining costs is discussed. The specific operations involved in forming various items of manufacture are described. The production tools required for the various processes are identified. The physical, chemical, and mechanical properties of the basic material are examined. The problems encountered in supporting thin flexible parts during machining are analyzed. Author

N75-13984 San Francisco Art Inst., Calif.
APPLICATIONS OF CURVED SYSTEMS
Derek Ball, Thomas Feldman, and Edwin Pickett *In* Soc. of the Plastics Ind., Inc. The Wide World of Plastic Tooling Apr. 1974 p 45-62 (For availability see N75-13975 05-27)

The use of plastic materials for producing curved structures is discussed. The structural design and framework development is described. Techniques for applying the plastic coating to obtain the desired effect are explained. The procedure is illustrated with line drawings. The effectiveness of the procedures is expressed in the configuration of the finished product. Author

N75-13985# Technische Universitaet, Hanover (West Germany).
PRODUCTION OF SiC LAYERS FROM A SILICON RICH MELT THROUGH FORCED MOTION OF THE LIQUID ZONE Ph.D. Thesis [HERSTELLUNG VON SIC-SCHICHTEN AUS EINER SI-REICHEN SCHMELZE DURCH ERZWUNGENE BEWEGUNG DER FLUESSIGEN ZONE]
Klaus Gillessen 1973 102 p refs In GERMAN
Avail: NTIS HC $5.25

An electrochemical procedure is reported for generating single crystal silicon carbide layers from silicon enriched melts by forced flow between two polycrystalline silicon carbide rods, one of which contains a silicon nucleation crystal. This method produces 1 mm thick single crystal carbide layers on hexagonal silicon carbide crystals at temperatures from 1800 to 1850 C.
Transl. by G.G.

N75-13986*# Princeton Univ., N.J. Dept. of Chemical Engineering.
INVESTIGATION OF STRUCTURE-PROPERTY RELATIONSHIPS IN SYSTEMATIC SERIES OF NOVEL POLYMERS Annual Report, 1 Mar. 1973 - 28 Feb. 1974
J. K. Gillham Aug. 1974 23 p refs
(Grant NGR-31-001-221)
(NASA-CR-141259) Avail: NTIS HC $3.25 CSCL 07B

The results are discussed of the on-line interface of the Torsional Braid Analysis experiment to an Hierarchical Computer System for data acquisition, data reduction and control of experimental variables. Some experimental results are demonstrated and the data reduction procedures are outlined. Several modes of presentation of the final computer-reduced data are discussed in an attempt to elucidate possible interrelations between the thermal variation of the rigidity and loss parameters. Author

N75-13987# Royal Aircraft Establishment, Farnborough (England).
THE ABSORPTION OF WATER BY PLASTICS
F. Blank Oct. 1974 16 p refs Transl. into ENGLISH from Plaste Kaut. (East Germany), v. 12, no. 11, 1965 p 657-659
(RAE-Lib-Trans-1814; BR44474) Avail: NTIS HC $3.25

A mathematical formula to express the absorption of water by plastics is presented. The derivation of the equation is explained. Charts are included to show the following: (1) progress of water absorption according to the formula, (2) progress with time of water absorption for various specimen thickness with the same volume, and (3) progress with time of the water absorption of three polyester specimens. Author

N75-13988*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
WEAR AND FRICTION OF OXIDATION-RESISTANT MECHANICAL CARBON GRAPHITES AT 650 C IN AIR
Gordon P. Allen and Donald W. Wisnader Washington Jan. 1975 14 p refs
(NASA-TN-D-7871; E-7993) Avail: NTIS HC $3.25 CSCL 11A

Studies were conducted to determine the friction and wear properties of experimental carbon-graphites. Hemispherically tipped carbon-graphite rider specimens were tested in sliding contact with rotating Inconel X-750 disks in air. A surface speed of 1.33 m/sec, a load of 500 g, and a specimen temperature of 650 C were used. Results indicate: (1) hardness is not a major factor in determining friction and wear under the conditions of these studies. (2) Friction and wear as low as or lower than those observed for a good commercial seal material were attained with some of the experimental materials studied. (3) The inclusion of boron carbide (as an oxidation inhibitor) has a strong influence on wear rate. (4) Phosphate treatment reduces the friction coefficient when boron carbide is not present in the base material. Author

N75-13989# California Univ., Livermore. Lawrence Livermore Lab.
MIXING PROCEDURE FOR ADIPRENE L-315/POLYOL ADHESIVE
H. G. Hammon 3 Dec. 1973 7 p refs
(Contract W-7405-eng-48)
(UCID-16413) Avail: NTIS HC $3.25

Adiprene L-315/polyol has been approved to replace Adiprene L-100/MOCA as a room temperature cured adhesive in many weapons and device applications. The use of MOCA has been severely restricted by OSHA (Occupational Safety and Health Administration). To assist those who need to use the adhesive, a mixing procedure is described for L-315/polyol adhesive, and a summary given of properties of the cured material. Author

N75-13990# Bendix Corp., Kansas City, Mo.
RIGID EPOXY FOAM ENCAPSULATION Final Report
F. C. Ayres Jun. 1974 112 p refs Revised
(Contract AT(29-1)-613)
(BDX-613-195-Rev) Avail: NTIS HC $5.25

The production capability to encapsulate electronic component assemblies of a major assembly, using a one-component rigid epoxy foam, was achieved. A complete characterization of the material properties was determined, and a potential back-up epoxy foam for the single source proprietary material was developed. Author

N75-13991# Bendix Corp., Kansas City, Mo.
DESIGN MANUAL FOR POLYSTYRENE FOAM, RELATING PHYSICAL, MECHANICAL, AND CHEMICAL PROPERTIES
D. J. Fossey Feb. 1974 54 p refs
(Contract AT(29-1)-613)
(BDX-613-1033) Avail: NTIS HC $4.25

A process has been developed to mold large cylinders of a high quality polymer. The process involves pre-expansion of expandable polystyrene beads to the desirable bulk density and molding the expanded beads into large cylinders using nitrogen to heat the beads in an autoclave to approximately 210 F (99 C). After molding, the foam cylinders are then machined into the desired shapes. The physical, mechanical, and chemical properties of the polystyrene bead foam are characterized in this document by a collection of tables and graphs. NSA

N75-13992# Sandia Labs., Albuquerque, N.Mex.
DETECTION OF CERAMIC SURFACE DEFECTS BY REFLECTED LASER LIGHT
D. Kramer and G. J. Hof Jun. 1974 34 p
(Contract AT(29-1)-789)
(SLA-74-186) Avail: NTIS HC $3.75

A pit, burr, and scratch detector was designed and built to provide electronic readout of unacceptable surface defects on ceramic substrates intended for use in hybrid microcircuits. The instrument was effective in detecting protruding type defects, but could not detect cracks, or pits or voids in substrate surfaces. Because of this limitation the instrument was considered not useful as a production tool for ceramic substrate inspection. The instrument did prove useful for pinhole detection in sputtered tantalum nitride resistor film on substrates. Author

N75-13993# Bendix Corp., Kansas City, Mo.
EVALUATION OF A HIGH TEMPERATURE SYNTACTIC FOAM
H. M. McIlroy Aug. 1974 25 p refs
(Contract AT(29-1)-613)
(BDX-613-1178-Rev) Avail: NTIS HC $3.25

The mechanical, physical, and thermal properties of a glass microballoon-filled polybenzimidazole resin were measured for test specimens molded by various manufacturing processes. The material was shown to be a high strength, thermally stable structural foam. Author

N75-13994# Oak Ridge Y-12 Plant, Tenn.
URETHANE ADHESIVES, AS L-100/MOCA SUBSTITUTES
F. G. Childress, C. E. Miller, and A. K. Zava Aug. 1974 23 p refs
(Contract W-7405-eng-26)
(Y-1952) Avail: NTIS HC $3.25

A number of urethane systems were evaluated as room temperature curing substitutes for Adiprene L-100/MOCA because of restrictions placed upon the use of MOCA by the Occupational Safety and Health Administration. Adhesive and bulk physical properties were determined for two systems both of which appear to be suitable substitutes for the L-100/MOCA system for many applications. Author

N75-13995# Bendix Corp., Kansas City, Mo.
EFFECTS OF VARYING FORMULATIONS OF THREE TDI POLYURETHANE FOAMS
R. F. Taylor and S. L. DeGisi Aug. 1974 33 p refs Revised
(Contract AT(29-1)-613)
(BDX-613-1137-Rev) Avail: NTIS HC $3.75

Studies were conducted on three TDI polyurethane foam materials to improve production yields of molded-to-size parts. The effects of changes in cell stabilizers, emulsifiers, catalysts, and the blowing agent were investigated. To evaluate formulation modifications, tests were performed to determine compressive strength, foam reactivity, and free-rise density. Changes in the visual appearance were also documented. Silicone surfactants were found to be superior to organic emulsifiers. In addition, an increase in water content produced parts rated superior to those produced by using the standard formulation. Author

N75-13996# Stuttgart Univ. (West Germany). Inst. fuer Kernenergetik.
DESIGN AND DEVELOPMENT OF A PHASE CHANGE MATERIAL THERMAL CONTROL DEVICE Final Report
A. Abhat Apr. 1974 196 p refs
(Contract ESTEC-1897/73-PP)
(ESRO-CR(P)-534) Avail: NTIS HC $7.00

The thermal performance at near-isothermal conditions of phase change material devices, for onboard satellite use, based on n-paraffins in aluminum containers and filler materials, was investigated both theoretically and experimentally. A prototype phase change device having a storage capacity of 50 watt-hour was constructed using honeycomb fillers. Results indicate that honeycomb packed devices are best suited for thermal control in the presence of low temperature gradients. A numerical prediction capabilty was developed by assessing a lumped capacity network using a computer program. ESRO

N75-13997# Royal Aircraft Establishment, Farnborough (England).
THE TENSILE BEHAVIOR AND VARIABILITY OF TEXTILE YARNS
Bridget Stagg Mar. 1974 34 p refs
(RAE-TR-74009; BR40340) Avail: NTIS HC $3.75

Tensile testing of yarns extracted from a set of commercially produced cordages of various fiber types and yarn constructions is described. Variations of tenacity, extension to break, energy absorption, and modulus are discussed together with the effects of surface finishing and heat treatments. The shapes of the stress-strain curves were examined and related to these properties. Statistical techniques were applied to assess the significance of the observations. Errors introduced into stress, modulus and energy absorption measurements by assuming a linear stress-strain curve were examined at various strain or stress levels through to break, and it is shown that regions of high extension produce high error. Author (ESRO)

N75-13998# Siemens A.G., Munich (West Germany). Fachabteilung Dielektrika.
PIEZOELECTRIC MATERIALS FOR HIGH FREQUENCY APPLICATION [PIEZOELEKTRISCHE WERKSTOFFE FUER HOCHFREQUENZANWENDUNGEN]
Christa Grabmaier and Helmut Thomann Bonn Bundesmin. fuer Forsch. und Technol. Oct. 1974 77 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.,
(BMFT-FB-T-74-30) Avail: NTIS HC $4.75; ZLDI, Munich 16,20 DM

An apparatus for growing Bi12GeO20, Bi12SiO20 single crystals and their mixed oxides, using the Czochralski method, was developed. The method was also applied on Gd2Gd2(MoO4)3, LiTaO3 and potassium hydrogen phthalate crystals. The crystallographic and piezoelectric properties of the crystals were investigated. All grown crystals were of good quality. The Bi-crystals and the phthalate show a large piezoelectric effect and the Gd-crystals have only a small piezoelectric coupling. ESRO

N75-13999# Solar, San Diego, Calif.
STATIC FATIGUE OF CERAMIC MATERIALS Interim Technical Report, 30 Jan. - 30 Jun. 1974
Mary E. Gulden and Arthur G. Metcalfe Jul. 1974 46 p refs
(Contract N00014-73-C-0401; NR Proj. 032-542)
(AD-786231; RDR-1778-2) Avail: NTIS CSCL 11/2

Time-dependent failure in the temperature range ambient to 900C is being studied using variable strain rate and static load tests in four-point bending. The materials investigated are sapphire, alumina, hot pressed Si3N4 and reaction sintered Si3N4. The bulk of the work is being performed on the latter two materials. The test environment has been varied to determine the effects of moisture and pH on time-dependent failure. All of the materials exhibited strain rate and/or time-dependent failures in this temperature range in an environment of flowing air, saturated with water at room temperature. The strength decrease is moisture-dependent and the decrease is more marked in the presence of acids. A theory is proposed for the mechanism of static fatigue of the polycrystalline materials. The theory is based on ion exchange occurring in the glassy grain boundary phase. (Modified author abstract) GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N75-14000# Technological Lab. RVO-TNO, Rijswijk (Netherlands).
DETERMINATION OF MICROHARDNESS OF SMOKELESS GUNPOWDER [DE BEPALING VAN DE MIKROHARDHEID VAN ROOKZWAK BUSKRUIT]
P. J. Greidanus 20 Jun. 1974 43 p refs In DUTCH
(Contract R-3076-I; A72/KL/096)
(TL-1974-17; TDCK-65086) Avail: NTIS HC $3.75

The Vickers microhardness of smokeless gunpowder was determined in order to develop a simple acceptance test method for procurement and production of the gunpowder, and also to study the structural cohesion. Cellulose nitrate and glyceroltrinitrate were investigated. A number of cellulose nitrate powder samples were artificially aged (416 hours at 70 C), and the same number was extracted with methylene chloride, 40 and 80 hours respectively. Artificial aging produced no change, whereas the extraction produced changes in microhardness as compared to the nontreated powder samples. A connection seems to exist between Vickers microhardness and power composition. ESRO

N75-14001# Technological Lab. RVO-TNO, Rijswijk (Netherlands).
IMPROVEMENT OF THE ACCEPTANCE AND SURVEILLANCE CONTROL OF NITRATE ESTER PROPELLANTS. PART 2: INVESTIGATION INTO THE CAUSE OF THE INITIAL HEAT EFFECT
W. Verbeek 15 Aug. 1974 13 p refs
(TL-1974-19-Pt-2; TDCK-65255; Pt-2) Avail: NTIS HC $3.25

The initial heat effect was investigated in cellulose nitrate propellants. Results show that it is not related either to moisture content or to time of storage production. Both the presence of oxygen and a large surface area of the propellant particles enhance the heat effect. The heat generation test should be carried out with unground propellant grains in air since this situation corresponds to the real storage situation. ESRO

N75-14002# Nederlands Scheeps-Studiecentrum TNO, Delft. Technische Afdeling.
ON THE POTENTIALITIES OF POLYPHENYLENE OXIDE (PPO) AS A WET-INSULATION MATERIAL FOR CARGO TANKS OF LNG-CARRIERS
G. Opschoor Jul. 1974 13 p refs
(Rept-194-M; TDCK-65202) Avail: NTIS HC $3.25

The possibility of applying PPO-foam for the wet insulation of liquified gas (LNG) tanks is discussed. Internal and external insulation systems are described, and properties of PPO-foam are treated. The mechanism of wet insulation is explained. Safety considerations require that a wet-insulation system consist of at least two layers, separated by a vapor barrier. Temperature distribution and thermal stresses in the materials were calculated for two wet-insulation models. It is concluded that PPO-foam is suitable for application as a wet-insulation material which can reduce the manufacturing costs of insulated LNG-tanks.
Author (ESRO)

N75-14003# Institut Franco-Allemand de Recherches, St. Louis (France).
THIN FILM METALLIC PRIMERS: CHOICE CRITERIA FOR METALS AND OPERATING CONDITIONS [AMORCES A COUCHE METALLIQUE: CRITERES POUR LE CHOIX DU METAL ET CONDITIONS DE FONCTIONNEMENT]
H. W. Koch 19 Jun. 1973 17 p In FRENCH
(ISL-CO-6/73) Avail: NTIS HC $3.25

A thin film metallic primer for direct ignition of secondary explosives is presented. The geometry of the primer in cases with and without a primary explosive is discussed leading to a reinforcement of the strength of the confining region. The detonation physics is outlined with regard to the correlation between electrical parameters and the minimal energy requirements for detonation onset. The properties of vacuum deposited metallic thin film are detailed with regard to aging. Stabilization processes are sought which would lead to the elimination of Ag and recommendation of prenucleation with Cr or Pt. ESRO

N75-14004# Thiokol Chemical Corp., Huntsville, Ala. Wasatch Div.
DEVELOPMENT OF HTPB PROPELLANT FOR BALLISTIC MISSILES Quarterly Progress Report, Apr. - Jun. 1974
Grant Thompson and Even E. Day Jul. 1974 26 p refs
(Contract F04611-72-C-0048)
(AD-786472; TWR-74493; AFRPL-TR-74-44; QPR-9) Avail: NTIS CSCL 21/9

The program objective is to develop a family of solid propellants for ballistic missiles based on an HTPB (hydroxyl terminated polybutadiene) binder, and to demonstrate one optimized propellant formulation by large scale motor firings. Specifically, five propellants have been formulated and are being characterized to the point that they will be ready for motor advanced development programs. These five propellants are compatible with two optimized missile systems: (1) a weight constrained small diameter three stage ballistic missile, and (2) a length constrained large diameter ballistic missile. In addition, a formulation which is typical of the entire series was fully defined, characterized, and demonstrated in the static firing of a Third Stage Minuteman III Motor (TU-775/01). Two additional Third Stage Minuteman III motors have been instrumented and loaded as structural test vehicles (TU-775/02 and TU-775/03). GRA

N75-14005# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
KEROSENE TYPE AVIATION TURBINE FUEL PROPERTIES SURVEY Final Report, Mar. 1971 - Sep. 1972
Royce P. Bradley Apr. 1974 81 p refs
(AF Proj. 3048)
(AD-786452; AFAPL-TR-74-7) Avail: NTIS CSCL 21/4

A survey was conducted to determine the physical properties, and particularly the thermal stabilities, of kerosene type commercial jet fuels produced by refineries throughout the world. The fuels were evaluated on the American Society for Testing and Materials-Coordinating Research Council (ASTM-CRC) Fuel Coker (Coker), Jet Fuel Thermal Oxidation Tester (JFTOT), and MINEX III thermal stability test devices. The average failure temperatures of the fuels are 369, 543, and the 510F for the Coker JFTOT, and MINEX III test devices, respectively. The physical properties of the fuels are documented. (Modified author abstract) GRA

N75-14006# Air Force Rocket Propulsion Lab., Edwards AFB, Calif.
SHELL-405 CATALYST IMPROVEMENT Final Report, Jul. 1970 - Jan. 1974
Ronald J. Meetin and Neil C. Newton Jul. 1974 165 p refs
(AF Proj. 3058)
(AD-786455; AFRPL-TR-74-36) Avail: NTIS CSCL 21/9

The objective of this program was to develop an improved Shell-405 catalyst with increased multiple ambient-start capability for spontaneously decomposing hydrazine in order to meet future Air Force satellite requirements on monopropellant attitude control engines. Experimental catalysts were evaluated to determine ambient-start life in 5-lb thrust hydrazine engines. In the first phase of the program different substrate materials were investigated in an effort to find a catalyst support that is better than Reynolds RA-1 alumina, the current standard. Although many of the other tested substrates exhibited potentially beneficial physical properties, Reynolds RA-1 clearly remains the best catalyst support for extended ambient-start usage. In the second phase of the program, differences in the catalyst manufacturing technique were further evaluated with this substrate. An above-standard active-metal loading in the range of 35% to 45% iridium offers the greatest promise for increasing catalyst life. (Modified author abstract) GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N75-14007# Bendix Corp., Kansas City, Mo.
PLATING ON POLYIMIDE
C. J. Stimetz Aug. 1974 12 p refs
(Contract AT(29-1)-613)
(BDX-613-1177-Rev) Avail: NTIS HC $3.25

Electroless coatings of nickel and copper from five electroless solutions were deposited on polyimide. Thicknesses approaching 90 microinches (2.3 micrometers) could be obtained but increasing the coating thickness beyond 90 microinches could only be achieved by electroplating. Four etching solutions for polyimides were investigated to determine their effect on the adhesion of the electroless coating to the polyimide. NSA

N75-14008# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.
SYSTEM FOR DEPOSITION AND HYDRIDING OF THIN METALLIC FILMS WITHOUT AIR EXPOSURE
C. C. Eichman, J. L. Comeau, and K. R. Rinehuls [1974] 17 p refs
(Contract AT(29-2)-656)
(GEPP-126) Avail: NTIS HC $3.25

A non-air exposed hydriding/deposition system provides advanced processing capability for hydriding erbium thin films. The system is designed with precise controls for cold crucible electron beam deposition of erbium, film deposition monitoring, and temperature bakeout. Using a mechanical transfer device, a complete hydriding process for erbium deposited films can be completed without air exposure. The system offers many

processing improvements such as the ability to make gas analyses during various phases of the processing (with the capability of isolating the analyzer tube when not in use), and isolation of the ion pumps for hydriding gases and atmospheric pressure. A major processing benefit is the capability to vacuum bake and hydride gas process the hydriding fixture before the disk substrates are transferred into the hydriding chamber. Author (NSA)

N75-14009# Bendix Corp., Kansas City, Mo.
DEVELOPMENT OF A FORMING STATION
J. D. Sheeley Aug. 1974 10 p refs
(Contract AT(29-1)-613)
(BDX-613-1123-Rev) Avail: NTIS HC $3.25

A forming station has been designed and fabricated. The forming stations allow automatic control of the pressure, temperature, vacuum, and cooling cycles required for pressure/vacuum dies used to form or bond aluminum-Mylar laminate, Mylar films, and polycarbonate sheets. NSA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N75-14010*# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE DEEP SPACE NETWORK Progress Report, Sep. - Oct. 1974
15 Dec. 1974 174 p refs
(Contract NAS7-100)
(NASA-CR-141147; JPL-PR-42-24) Avail: NTIS HC $6.25 CSCL 17B

The progress is reported of Deep Space Network (DSN) research in the following areas: (1) flight project support, (2) spacecraft/ground communications, (3) station control and operations technology, (4) network control and processing, and (5) deep space stations. A description of the DSN functions and facilities is included. N.E.R.

N75-14011*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
FILTERING DEVICE Patent Application
Thomas R. Edwards and Hugh W. Zeanah, inventors (to NASA) Filed 17 Dec. 1974 9 p
(NASA-Case-MFS-22729-1; US-Patent-Appl-SN-533608) Avail: NTIS HC $3.25 CSCL 17B

An electrical filter is described for removing noise from voice communications signals. Filtering is accomplished by adding balanced, with respect to a midpoint sample, spaced pairs of the sampled signal values, and then multiplying each pair by a selected filter constant. The signal products thus obtained are summed to provide a filtered version of the original signal. NASA

N75-14012# Technische Universitaet, Hanover (West Germany).
REALIZATION OF SYNTHETIC TELEVISION IMAGES THROUGH ADVANCED STATISTICS Ph.D. Thesis [REALISIERUNG SYNTHETISCHER FERNSEHBILDER MIT VORGEBENER STATISTIK]
Gerhard Mahler 1974 194 p refs In GERMAN
Avail: NTIS HC $7.00

A stochastic video process is reported that gathers image information for television pictures by signal scanning with subsequent linear filtering. Transl. by G.G.

N75-14013*# Technology Service Corp., Silver Spring, Md.
STUDY OF RADAR PULSE COMPRESSION FOR HIGH RESOLUTION SATELLITE ALTIMETRY Final Report, Oct. 1972 - May 1973
R. P. Dooley, F. E. Nathanson, and L. W. Brooks Dec. 1974 176 p refs
(Contract NAS6-2241)
(NASA-CR-137474; TSC-WO-111) Avail: NTIS HC$7.00 CSCL 17I

Pulse compression techniques are studied which are applicable to a satellite altimeter having a topographic resolution of + 10 cm. A systematic design procedure is used to determine the system parameters. The performance of an optimum, maximum likelihood processor is analysed, which provides the basis for modifying the standard split-gate tracker to achieve improved performance. Bandwidth considerations lead to the recommendation of a full deramp STRETCH pulse compression technique followed by an analog filter bank to separate range returns. The implementation of the recommended technique is examined. Author

N75-14014# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
FUNDAMENTALS OF GENERATION AND SUPPRESSION OF CORRELATED SURVEILLANCE RADAR CLUTTERS USING DIGITAL FILTERS [GRUNDLAGEN DER ERZEUGUNG UND UNTERDRUECKUNG VON KORRELIERTEN RUNDSICHTRADARSTOERUNGEN MIT DIGITALEN FILTERN]
R. Klemm Feb. 1974 88 p refs In GERMAN; ENGLISH summary
(Rept-218) Avail: NTIS HC $4.75

The problem of clutter suppression by different types of digital filters (recursive, nonrecursive, mixed) was examined for digital surveillance radar. In addition, the generation of clutter signals (clutter simulation) was investigated. Recursive and nonrecursive filters are described by means of the statistical properties of ergodic processes. Optimal and suboptimal solutions are given. The statistical description of a mixed filter which consisted of cascaded recursive and nonrecursive parts, made use of a special procedure called process analysis. A stability criterion, based on statistical description of recursive filters, is given. Practical examples of filters were applied to clutter correlation functions computed from measurements. Practical results, such as two simple suboptimal correlating and decorrelating filters, are given. ESRO

N75-14015# Birmingham Univ. (England). Dept. of Electronic and Electrical Engineering.
INVESTIGATION OF REFLECTOR-ANTENNA RADIATION Final Report
A. W. Rudge and M. Shirazi 11 Jun. 1974 75 p refs
(Contract ESRO-SC/11/73/HQ)
(ESRO-CR(P)-492) Avail: NTIS HC $4.25

The derivation and programming of mathematical models for both offset and symmetrical parabolic reflectors with either linear or circularly-polarized primary feeds is described. Feed location is constrained to the general vicinity of the geometric focus, and, in the case of the symmetrical (paraboloidal) reflectors, aperture blocking effects are modelled by the shadow-diffraction technique. Theoretical models were applied to study the radiation from a typical one meter diameter paraboloidal reflector-antenna operating at 12 GHz. Sources of cross-polarized radiation were identified. ESRO

N75-14016# Eurosat S.A., Geneva (Switzerland).
STUDY OF THE ECONOMIC RETURN OF AN OPERATIONAL MARITIME SATELLITE SYSTEM Final Report
22 Jul. 1974 123 p
(Contract ESRO-SC/27-HQ)
(ESRO-CR(P)-512) Avail: NTIS HC $5.25

The economic viability of a worldwide maritime communication satellite system is discussed. The evaluation of a users' survey, held among industry, telecommunication bodies, and shipowners, is presented. The selection of system parameters, such as satellite, launcher, shipborne terminals, ground support, tariffs, traffic, manpower, and consumables, is dealt with. A mathematical model is detailed and several computer runs are discussed. ESRO

N75-14017# Army Electronics Command, Fort Monmouth, N.J.
SUMMARY OF IONOSPHERIC FORECASTING SCHEMES FOR TACTICAL FIELD ARMY COMMUNICATIONS Final Report, Jul. 1973 - Jun. 1974
George E. Krause and Richard J. DAccardi Jul. 1974 14 p refs
(DA Proj. 1S7-62701-AH-92)

(AD-786497; ECOM-4230) Avail: NTIS

This report summarizes efforts to develop a near-real-time forecasting technique patterned after the Box-Jenkins methodology, for predicting ionospheric conditions over tactical communications routes up to 500 km in length where the underlying process was found to be nonstationary. The technique, which uses real-time vertical incidence data to prepare near-real-time forecasts for short oblique incidence paths, is now feasible due to the development of small, portable, VI ionospheric sounders, suitable antennas, and mini-computers capable of translating sounder observations into reliable forecasts. GRA

N75-14018# Army Foreign Science and Technology Center, Charlottesville, Va.

EFFECT OF METEOROLOGICAL CONDITIONS ON RADAR

V. D. Stepanenko 9 Jan. 1974 54 p refs Transl. into ENGLISH from the book "Radiolokatsiyav Meteorologii" Leningrad, Gidrometeorizdat, 1973 p 314-340

(AD-786806; FSTC-HT-23-326-74) Avail: NTIS CSCL 17/9

The author considers the effect of the damping of electromagnetic waves during bad weather on the detection range of a radar station. GRA

N75-14019# GTE Sylvania, Inc., Needham Heights, Mass. Electronic Systems Group.

MEGABIT DIGITAL TROPOSCATTER SUBSYSTEM (MDTS) Semiannual Progress Report, 12 Nov. 1973 - 11 May 1974

Charles Benevides, J. W. Graham, Dale R. Kern, and P. Monsen Jun. 1974 89 p refs Prepared in cooperation with Signatron, Inc.

(Contract DAAB07-74-C-0040)

(AD-786674; ECOM-0040-1-74; SAPR-1) Avail: NTIS CSCL 17/2

The primary objective of the MDTS is to produce a wideband digital data modem and appropriate link modifications to convert established DCS troposcatter links from analog to digital operation. The MDTS program provides for the design, development, fabrication, and test of eight engineering models of this modem. Established MDTS modem throughput data rates are 1.544 Mbps, 3.088 Mbps, 6.276 Mbps over path lengths up to 250 N Miles and 9.1414 Mbps, 12.552 Mbps over path lengths up to 150 N Miles. (Modified author abstract) GRA

N75-14020# Hughes Aircraft Co., Fullerton, Calif. Ground Systems Group.

ACOUSTIC VELOCITY CORRELATOR Semiannual Report, 1 Sep. 1973 - 28 Feb. 1974

R. C. Knittle and T. W. Bristol Sep. 1974 30 p refs

(Contract DAAB07-72-C-0121; DA Proj. 7X2-63304-D-215)

(AD-785729; FR-74-14-626; ECOM-0121-3-72) Avail: NTIS CSCL 17/9

The object of the program is to determine the feasibility of implementing the velocity correlator network of a Pulse Burst Processor System using acoustic surface waves. The acoustic velocity correlator is a network of multiple tapped delay lines which corrects the Doppler time shifts of the output signals from a pulse burst correlator tapped delay line and sums the corrected signals in a single Doppler velocity channel. A 20 MHz bandwidth prototype device was developed during the first phase of the program. (Modified author abstract) GRA

N75-14021# DBA Systems, Inc., Melbourne, Fla.

SARRA, A COMPUTER PROGRAM FOR THE SHORT ARC REDUCTION OF RADAR ALTIMETRY Final Report, Jan. - Jul. 1974

Jerry E. Trotter Jul. 1974 32 p refs

(Contract F19628-74-C-0138; AF Proj. 3205)

(AD-786479; AFCRL-TR-74-0300) Avail: NTIS CSCL 08/5

The program SARRA exploits short arc reduction of radar altimetry in determining the geoid surface in the North Atlantic. Unlike other approaches in the use of satellite altimetry, SARRA does not require highly accurate orbits of 1 to 2 meters. The major advantage offered by the short arc approach is that it in no way depends on the establishment of a highly accurate reference orbit and thus places only minimal requirements on satellite tracking by external systems. Author (GRA)

N75-14022# Naval Ordnance Lab., White Oak, Md.

SCATTERING OF ELECTROMAGNETIC RADIATION BY APERTURES. 8: THE INFORMALLY SLOTTED CYLINDER THEORY Final Report

R. L. Kligman and L. F. Libelo 7 Jun. 1974 62 p refs

(ZR0110101; ZF52553001)

(AD-786727; NOLTR-74-35) Avail: NTIS CSCL 20/14

This report presents as an introduction, a preliminary statement describing the research program on scattering by cylindrical systems. This is followed by a formal derivation of the expressions for the scattered fields in terms of the currents induced on a normally slotted, conducting, infinite cylinder irradiated by a linearly polarized, monochromatic plane electromagnetic wave. Following this the authors present an alternate formal solution to the same scattering problem in terms of the tangential components of the electric field over the aperture or slot region. Author (GRA)

N75-14023# Mission Research Corp., Santa Barbara, Calif.

HAPREX PLANNING Memorandum Report, Jun. - Dec. 1973

R. Hendrick, Jr. and T. Barrett Jun. 1974 13 p refs Prepared in cooperation with General Electric Co., Santa Barbara, Calif.

(Contract DAAD05-73-C-0539; DA Proj. 1T1-62111-A-116)

(AD-786611; MRC-R-108; BRL-CR-164) Avail: NTIS CSCL 04/1

HAPREX is an ABMDA-sponsored project dealing with studies of the effects of high altitude striated ionization on radar performance. This project employs barium clouds, released at high altitudes, which are ionized by solar radiation and striated by gradient drift forces produced by winds and (E vector) x (B vector) forces. The use of barium was originally sponsored by ARPA under Project SECEDE. ABMDA continued this sponsorship to assist in the development of assessment and mitigation techniques to optimize BMD radar system performance in a nuclear environment. GRA

N75-14024# North Carolina State Univ., Raleigh. Dept. of Electrical Engineering.

ENTROPY CODED DIFFERENTIAL PULSE CODE MODULATION SYSTEMS FOR TELEVISION Interim Report

Shri Krishna Goyal Apr. 1974 100 p refs

(Contract F44620-69-C-0033; AF Proj. 9769)

(AD-784827; AFOSR-74-1406TR) Avail: NTIS CSCL 17/2

Two basic types of communication systems are presently available for information transmission: analog systems and digital systems. The analog system has the handicap that the channel adds varying amounts of random noise to the signal being transmitted. This limitation can be overcome in digital transmission systems. A digital system does not have any basic distance limitation if a reasonable signal to noise ratio is maintained. This can be accomplished through the use of regenerative repeaters. The advantage of pulse code modulation transmission have been studied by Oliver, Pierce and Shannon. GRA

N75-14025# Army Foreign Science and Technology Center, Charlottesville, Va.

PROBLEMS IN SYNTHESIZING AMPLITUDE RADIATION PATTERNS

Yu. I. Choni 9 Apr. 1974 12 p refs Transl. into ENGLISH from Tr. Aviats. Inst. (Kazan), no. 1, 1970 p 3-10

(AD-785888; FSTC-HT-23-1719-73) Avail: NTIS CSCL 09/5

The problem of the optimal root-mean-square approximation to a desired amplitude radiation pattern, free of any constraints on the nature of antenna excitation, is examined. GRA

N75-14026# Illinois Univ., Urbana. Dept. of Civil Engineering.

GEOMETRIC ANALYSIS OF THE RBV TELEVISION SYSTEM Final Report

Kam W. Wong Jun. 1974 81 p refs

(Contract DI-14-08-0001-12631)

(PB-235067/6; UILU-ENG-74-2007; Ser-42) Avail: NTIS HC $4.75 CSCL 08B

Both the RBV and the MSS images from ERTS-1 can potentially be used for 1:250,000 scale mapping. With two photo-identified ground control points in each frame for orientation, a bulk RBV image can be used directly without any further

geometric processing for 1:500,000 scale mapping. A minimum of four and perhaps as many as ten such ground control points will be needed to calibrate the distortions in a MSS frame; and a distortion correction procedure must be applied to the image before it can be used for 1:500,000 scale mapping. Based on both theoretical and experimental studies, high-degree polynomials were found to be highly effective in modeling the total geometric distortions in both the RBV and the MSS systems. Computer programs were developed for performing both pre-flight and inflight calibration of the geometry of the RBV system, and a new Reseau pattern consisting of 31 reseau points was recommended for future RBV systems in ERTS application. GRA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N75-14027*# Texas A&M Univ., College Station. Inst. for Solid-State Electronics.
INFLUENCE OF MATERIAL QUALITY AND PROCESS-INDUCED DEFECTS ON SEMICONDUCTOR DEVICE PERFORMANCE AND YIELD
W. A. Porter and W. R. McKee [1974] 54 p
(Contract NAS8-26379)
(NASA-CR-120557) Avail: NTIS HC $4.25 CSCL 20L

An overview of major causes of device yield degradation is presented. The relationships of device types to critical processes and typical defects are discussed, and the influence of the defect on device yield and performance is demonstrated. Various defect characterization techniques are described and applied. A correlation of device failure, defect type, and cause of defect is presented in tabular form with accompanying illustrations. N.E.R.

N75-14028# Aeronautical Research Labs., Melbourne (Australia).
A HIGH FREQUENCY VOLTAGE-CONTROLLED PHASE SHIFTER
C. W. Sutton and A. J. Farrell Apr. 1974 24 p ref
(ARL/Inst-Note-82) Avail: NTIS HC $3.25

A phase-shifter is described with an operating frequency range up to 10 MHz and a linear, voltage-controlled phase-shift range of 360 deg. The design has proved to be reliable, stable, and accurate in operation. Author

N75-14029# Technische Universitaet, Hanover (West Germany).
ELECTRIC OSCILLATING ARMATURE MOTOR Ph.D. Thesis [ELEKTRISCHER SCHWINGANKERMOTOR]
Borislav O. Pantic 1974 95 p refs In GERMAN
Avail: NTIS HC $4.75

Design calculations for oscillating armature motors (synchronized vibrators) are presented. Numerous nomograms for important technical parameters are attached for evaluating possible construction designs. The effects of friction, air resistance, current temperature, and iron loss are not considered in performance predictions for motor designs. Transl. by G.G.

N75-14030*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
TANTALUM CAPACITOR BEHAVIOR UNDER FAST TRANSIENT OVERVOLTAGES
J. A. Zill and K. D. Castle Dec. 1974 26 p
(NASA-TM-X-58152; JSC-09214) Avail: NTIS HC $3.75 CSCL 09A

Tantalum capacitors were tested to determine failure time when subjected to short-duration, high-voltage surges caused by lightning strikes. Lightning is of concern to NASA because of possible damage to critical spacecraft circuits. The test was designed to determine the minimum time for tantalum capacitor failure and the amount of overvoltage a capacitor could survive, without permanent damage, in 100 microseconds. All tested exhibited good recovery from the transient one-shot pulses with no failure at any voltage, forward or reverse, in less than 25 microseconds. Author

N75-14031# Royal Aircraft Establishment, Farnborough (England).
CALCULATION OF THE EQUIVALENT INDUCTANCE OF A THREE-PHASE SYNCHRONOUS GENERATOR, WITHOUT DAMPER WINDING, WORKING INTO A RECTIFIED LOAD
N. A. Panfilov Oct. 1974 14 p refs Transl. into ENGLISH from Elektrotekhnika (USSR), v. 5, 1973 p 15-17
(RAE-Lib-Trans-1780; BR44280) Avail: NTIS HC $3.25

Methods for determining the equivalent switching inductive reactance of a three-phase rectified generator are presented. The most widely used method is based on representing the switching process as a two-phase circuit. The numerical relationships of the parameters are established. Diagrams are provided to show: (1) phase circuit connections for a rectified generator in the three-rectifier regime, (2) external characteristics of a welding rectified generator on the ac side, and (3) phase current curves. Author

N75-14032*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ASTP SIMULATED LIGHTNING TEST REPORT
R. L. Blount, R. D. Gadbois, D. L. Suiter, and J. A. Zill Nov. 1974 67 p refs
(NASA-TM-X-72171; JSC-09221) Avail: NTIS HC $4.25 CSCL 09C

A simulated lightning test was conducted on the backup spacecraft for the Apollo Soyuz Test Project mission (CSM-119) to determine the susceptibility of the Apollo spacecraft to damage from the indirect effects of lightning. It is demonstrated that induced lightning effects from low-level injected currents can be scaled linearly to those which are obtained in a full threat lightning stroke. Test results indicate that: (1) many of the power and signal critical circuits would fail if subjected to full-threat lightning, (2) pyrotechnic circuits are safe for full-threat lightning, and (3) common-mode voltages exceeded the failure criteria level for all but three of the circuits tested. Author

N75-14033# Los Alamos Scientific Lab., N.Mex.
DAMAGE RESISTANCE OF DIELECTRIC REFLECTORS FOR PICOSECOND PULSES
B. E. Newman 1974 11 p refs Presented at ASTM Workshop, Boulder, Colo., 22 May 1974 Sponsored by AEC
(LA-UR-74-1053; Conf-740524-3) Avail: NTIS HC $3.25

A state-of-the-art survey was conducted to determine the range of damage thresholds of electron-gun-produced dielectric reflectors irradiated by 30-ps laser pulses at 1.06 microns. Seven commercial coating companies, experienced in producing refractory-oxide coatings, supplied total reflectors of a specified TiO_2/SiO_2 design deposited on low-scatter glass substrates provided by LASL. Optional reflectors of ZrO_2/SiO_2 were also evaluated. Single-shot thresholds were determined by laser-induced scatter and photoelectric detection of spark radiation. Thresholds of TiO_2/SiO_2 reflectors ranged from 1 to 4 J/sq cm; those for ZrO_2/SiO_2 reflectors ranged from 0.5 to 2 J/sq cm. Reflectors which exhibited a large amount of diffuse, weak-signal scatter generally had low thresholds. NSA

N75-14034# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
HIGH-VOLTAGE PULSE GENERATOR
G. Klement and H. Wedler Mar. 1974 67 p refs In GERMAN
(IPP-4/114) Avail: AEC Depository Libraries HC $6.50

The described generators were developed as a standard series. The design was concerned with low inductance, but rather with simple construction and low price. For each of four different types of capacitors one-to-five-stage generators were developed and tested. The data of the individual types of generators are listed in table form and a few oscillograms for typical applications are presented. The jitter and delay as function of the charging voltage show the range of operation. The above information is completed by individual circuits. The components used, such as spark gaps, pulse transformer, shorting facilities

etc. were also presented in separate tables for the pulse cables and pulse capacitors. Author (NSA)

N75-14035# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).

METHODS OF DETECTING AND LOCATING FAULTS OF COMBINATORIAL AND SEQUENTIAL CIRCUITS

H. D. Hoelzer, H. Roeck, and J. Waidelich Mar. 1974 61 p refs In GERMAN; ENGLISH summary

(KFK-PDV-21) Avail: AEC Depository Libraries HC $6.25

Consideration of the advantages of automatic fault diagnosis in digital systems is followed by a discussion of the methods of detecting and locating faults on the gate-level which emphasizes combinatorial and sequential circuits. Author

N75-14036# California Univ., Berkeley. Lawrence Berkeley Lab.

JOSEPHSON JUNCTIONS AS MICROWAVE HETERODYNE DETECTORS Ph.D. Thesis

Y. Taur Apr. 1974 133 p refs

(Contract W-7405-eng-48)

(LBL-2597) Avail: NTIS HC $5.75

The properties of point contact Josephson junctions operated as 36 GHz heterodyne detectors have been extensively studied. The measured performance is in good agreement with the theory developed for microwave coupling, conversion efficiency, and intrinsic noise based on the resistively shunted junction model. A tunable cavity matching structure was designed to obtain good RF coupling to the point contact. By operating vanadium junctions at 1.4 K, a single side band mixer noise temperature of 54 K (referred to the input) with a conversion gain of 1.35 and a signal bandwidth of the order of 1 GHz was obtained. This is significantly better than existing resistive mixers in this frequency range. Harmonic mixing, mixing in the presence of relaxation oscillation, and self local oscillator mixing with Josephson junctions were tried also, but the results are not as promising as fundamental mixing with an external local oscillator. Finally, two additional topics are discussed: a Josephson effect homodyne detector, and a proposed design for superconducting bolometers making use of the recently developed superconducting quantum interference devices. Author (NSA)

N75-14037# Technische Hochschule, Darmstadt (West Germany). Inst. fuer Nachrichtentechnik.

ANALYSIS OF LINEAR ACTIVE (n PLUS 1)-POLES BY SIMPLE TRANSFORMATIONS OF THE NODAL ADMITTANCE MATRIX [ANALYSE LINEARER AKTIVER (n PLUS 1) POLE DURCH EINFACHE TRANSFORMATIONEN DER KNOTENLEITWERTMATRIX]

Heinz Thielmann 1973 29 p refs In GERMAN Revised

(IND-FB-23-Rev; IND-FB-21) Avail: NTIS HC $3.75

A method is described for the analysis of linear networks, consisting of linear, passive or active, ideal or non-ideal twoports (threepoles or fourpoles) with existing chain matrices. The method is especially adapted to networks with twoports, with a non-existing admittance matrix, such as transformers, proportionally controlled sources, and mellators. The twoport elements are taken into consideration by simple line and column transformations after establishing the nodal admittance matrix of the partial network consisting of only twopoles. A stepwise elimination of interior network nodes is obtained, and thereby a reduction of the matrix order. Examples are given for a transformer network (bridged tee), a nonideal integrator, a first order lowpass filter, and a transistor amplifier. ESRO

N75-14038# Ruhr Univ., Bochum (West Germany). Abteilung Maschinenbau.

INVESTIGATION OF SELF OSCILLATION BEHAVIOR OF ONE- AND TWO-PARAMETER RELAY CONTROL SYSTEMS WITH ASYMMETRIC LINEAR ELEMENTS Ph.D. Thesis [UNTERSUCHUNG DES EIGENSCHWINGVERHALTENS VON EIN- UND ZWEIGROESSEN-RELAIS-REGELSYSTEMEN MIT ASYMMETRISCHEN LINEARTEILEN]

Hans P. Joergl May 1974 167 p refs In GERMAN

(RUB-LMRT-3) Avail: NTIS HC $6.25

The self oscillation behavior of one and two-parameter relay feedback control systems was analyzed for the general case that the existing linear parts have an asymmetric transfer function. Existence conditions for self oscillations were derived whereby the self oscillation states are defined by the situation in which control parameters oscillate with the same frequency and the relays only switch once per period. Analog computer investigations were carried out for a number of examples to demonstrate the various self oscillation states for one and two-parameter systems. Evaluation of the derived existence conditions took place with a digital computer. The analysis of the two-parameter system was systemized and a possible synthesis using amplification compensation is discussed. ESRO

N75-14039# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.

PIN DIODES FOR RF SWITCHING AND ATTENUATION NETWORKS AND IN RADIO AND TV TUNERS [PIN-DIODEN FUER HF-SCHALTER UND DAEMPFUNGSNETZWEREKE IN TUNERN]

Guenter Olk, Winfried Kurth, Hartwig Koellner, and Walter Hirschmann Bonn Bundesmin. fuer Forsch. und Technol. Jun. 1974 75 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-74-12) Avail: NTIS HC $4.25; ZLDI, Munich 15,35 DM

The design of a PIN-diode for continuous voltage attenuation in the frequency range 45 to 860 MHz is described. The diode, produced of high resistivity p-type Si by paint-on technology improves the large signal behavior of modern TV-tuners considerably. With permissible interfering voltages up to 1 V sub eff in a 3 diode-pi-network a maximum insertion loss > 34 db and a minimum insertion loss < 1 db is achieved in the frequency range 45 to 860 MHz, using regulating currents between 0 to 10 mA. Installations for economic large scale production are described and some results of reliability tests are reported. Improvements of large signal behavior for frequencies < 1 MHz and possibilities of designing an integrated PIN-diode-network are discussed. Author (ESRO)

N75-14040# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.

IMAGE STORAGE TUBE [SPEICHERNDE BILDAUFNAHMEROEHRE]

Wolfgang Welsch Bonn Bundesmin. fuer Forsch. und Technol. Jun. 1974 51 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-13) Avail: NTIS HC $4.25; ZLDI, Munich 10,30 DM

A description is given of a 1 inch charge storage tube with silicon diode array target which, apart from the PN photodiodes, MOS capacitances and the influence of surface potentials play an important role. The tube can be operated as a vidicon type camera tube or as a storage tube for optical and electrical signals. Special features are low lag in vidicon operation, a very long reading time, and the ability to store optically or electrically written signals for weeks. Under normal television standards, the limiting resolution is 930 lines, making the tube suitable for many television applications. The tube has a reduced lifetime, due to an X-ray generation on the field mesh, which produces an increasing of the reverse current. Two ways of solving this problem are given. Author (ESRO)

N75-14041# Siemens-Schuckertwerke A.G., Erlangen (West Germany).

SUPERCONDUCTIVE NIOBIUM LAYERS [SUPRALEITENDE NIOB-SCHICHTEN]

Heinrich Diepers, Bernhard Hillenbrand, Hans Martens, Otto Schmidt, Kurt Schnitzke, Yilmaz Uzel, and Karl Wohlleben Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 120 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-19) Avail: NTIS HC $5.25; ZLDI, Munich 25,20 DM

Niobium cavities with high quality factor and high microwave critical magnetic flux densities were prepared. Various starting materials, manufacturing methods, and surface preparation techniques were investigated. Highest quality factor values were obtained in TE011 modes and also in TM010 modes with X-band cavities machined from solid niobium and finished by a special

electropolishing process and by repeated anodizing. The cavities exhibit no degradation even on exposure to atmospheric air or irradiation with accelerated protons. ESRO

N75-14042# AEG-Telefunken, Ulm (West Germany). Fachbereich Roehren.

A NEW POST ACCELERATION METHOD FOR OSCILLOGRAPH TUBES Triannual Report, 1 Jan. 1970 - 31 Dec. 1972 [NEUARTIGES NACHBESCHLEUNIGUNGSVERFAHREN FUER OSZILLOGRAPHENROEHREN BERICHTSZEITRAUM 1.1.70-31.12.72]

P. Schackert Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 66 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-21) Avail: NTIS HC $4.25; ZLDI, Munich 13,90 DM

The electron optical properties of a post deflection acceleration lens are described. In an oscillograph the lens allows high deflection sensitivity and high writing speed. The behavior of a group of triodes having all the same cut-off voltage is discussed with respect to its physical dimensions in order to optimize writing speed. The principles and dimensions of helical waveguides for the deflection of electrons are discussed. Experimental tubes are described. Author (ESRO)

N75-14043# AEG-Telefunken, Ulm (West Germany). Fachbereich Roehren.

DIRECT VIEW STORAGE TUBES OF HIGH WRITING SPEED Biennial Report, 1 Apr. 1971 - 31 Mar. 1973 [SICHTSPEICHERROEHREN HOHER SCHREIBGESCHWINDIGKEIT BERICHTSZEITRAUM 1.4.71-31.3.73]

U. Ritter Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 41 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-22) Avail: NTIS HC $3.75; ZLDI, Munich 8,65 DM

Mesh storage tubes and screen storage tubes of high writing speed are described and the relation between characteristic curves and writing speed is discussed. Dependence of writing speed on physical tube parameters is investigated. Results show that if the present structure of storage tubes is maintained, increase in writing speed can only be achieved by a higher secondary emission ratio. ESRO

N75-14044# Siemens A.G., Munich (West Germany). Werk Roehren.

SUBMILLIMETER WAVE GENERATORS FOR PHYSICAL, CHEMICAL AND MEDICAL RESEARCH [SUBMILLIMETERWELLEN-GENERATOREN FUER PHYSIKALISCHE, CHEMISCHE UND MEDIZINISCHE FORSCHUNG]

Erich Glass Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 34 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-23) Avail: NTIS HC $3.75; ZLDI, Munich 7,15 DM

A backward wave oscillator operating in the frequency range of 320 to 480 GHz is described. It is intended for use in physical, chemical, and medical research. ESRO

N75-14045# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.

HIGH VALUE RESISTORS OBTAINED BY METALLIC ION IMPLANTATION IN THERMAL SILICA [REALISATION DE RESISTANCES DE FORTES VALEURS PAR IMPLANTATION D'IONS METALLIQUES DANS LA SILICE THERMIQUE]

D. Esteve, J. Buxo, G. Sarrabayrouse, and M. Saleh 1974 12 p refs In FRENCH Presented at the 4th Intern. Avisem 74 Congr. Appl. des Processus Electron. et Ioniques, Toulouse, 8-11 Oct. 1974

(LAAS-Publ-1204) Avail: NTIS HC $3.25

New techniques for obtaining high value resistors by ion implantation are presented. The use of a thin metallic film on silicon oxide before implantation is shown to improve reproducibility. The obtained structures are sensitive to torsional mechanical constraints which makes them useful in extensometry. The samples preparation and measurement procedures are detailed. Experimental results are discussed with regard to volt amphere characteristics, thermal structure behavior, and structure behavior under mechanical constraints. ESRO

N75-14046# Selenia S.p.A., Rome (Italy). Space and Telecommunications Div.

HIGH POWER OUTPUT CIRCUIT STUDY Final Report

Jul. 1974 140 p

(Contracts ESTEC-1819/72; ESRO-858)

(ESRO-CR(P)-545) Avail: NTIS HC $5.75

The feasibility of an output circuit subassembly linking two high power amplifiers to an antenna for satellite applications was investigated. The frequency band ranges between 11.7 and 12.5 GHz and the output power of the amplifier between 100 and 800 W. Theoretical trade-offs for solutions included detailed analysis of X-band waveguides, switches, filters, and thermal chokes. Two waffle iron filters were developed and tested. A measurement technique was optimized for testing the insertion loss of waveguide samples before and after chemical surface treatment. High power thermovacuum tests on waveguide and filter prototypes showed no glow phenomena. Critical areas are expected for power above 200 W. ESRO

N75-14047# Telefonaktiebolaget L. M. Ericsson, Stockholm (Sweden).

ANTENNA ARRAYS USING HIGH GAIN ELEMENT RADIATORS. BEAM FORMING AT IF

O. Ring Sep. 1974 160 p refs

(Contract ESTEC-2126/73-HP)

(Rept-1974-09-17; MI/Kd-4363; ESRO-CR(P)-546) Avail: NTIS HC $6.25

In connection with Aerosat communication requirements, four different types of system for beam forming at IF were investigated: fixed beam forming (FBF), scannable beam forming (SBF), adaptive beam forming (ABF), and retrodirective beam forming (RBF). The study of FBF resulted in two possible solutions of which phase shifting in the second LO branch is recommended for future application. The SBF study resulted in five possible solutions. Among these the one with electronically controlled phase shifting in the second LO branch was chosen. The ABF study resulted in one possible solution. This is ABF with phase locked loops after channel separation. The RBF study resulted in four possible solutions. Among these the one with ABF on reception and SBF on transmission is recommended. Beam direction accuracy converted into phase requirements, weight, and volume were used as comparison criteria for the systems investigated. ESRO

N75-14048# Signatron, Inc., Lexington, Mass.

ELECTRONIC DEVICE MODELING Interim Technical Report, 13 Nov. 1973 - 13 Feb. 1974

L. Ehrman Aug. 1974 74 p refs

(Contract F30602-73-C-0193)

(AD-786422; RADC-TR-74-203; ITR-4) Avail: NTIS CSCL 09/1

The integral charge control model of the bipolar junction transistor is reviewed, and the software which has been developed for estimating the model parameters from device measurements is discussed. An example of parameter estimation is given, and default parameter values listed. The SIGNCAP I input structure for both the charge control model and the field effect transistor model are given. Author (GRA)

N75-14049# Aerospace Corp., El Segundo, Calif.

MULTIBAND REFLECTOR ANTENNA SYSTEMS STUDY Final Report

Jimmy L. Wong and Howard E. King 30 Aug. 1974 46 p refs

(Contract F04701-74-C-0075)

(AD-785959; TR-0075(5230-40)-2; SAMSO-TR-74-214) Avail: NTIS CSCL 09/5

A study was made to investigate the feasibility of utilizing a single reflector aperture radiating at UHF, L-band, and C-band frequencies. Radiation measurements were performed at UHF (335 MHz) and at L-band (1200 to 1600 MHz). The feasibility of an integrated L-band and C-band feed system was established; however, no measurements were made on the C-band characteristics because it was an optional requirement. Two types of L-band feeds were evaluated: a cavity-backed open-sleeve dipole, and a probe-excited coaxial cavity. The measured VSWR and

patterns of these feeds are shown. The cavity-backed dipole feed was incorporated into a 6-ft parabolic reflector to determine the reflector antenna performance at L-band with and without the presence of a UHF dipole mounted at the vertex of the reflector. With the UHF dipole mounted at the vertex of the reflector and as a prime-focus feed, the UHF radiating characteristics were measured. Concepts for integrating a C-band system with the L-band feeds are provided. Author (GRA)

N75-14050# Kentucky Univ., Lexington. Dept. of Electrical Engineering.
COUPLED TRANSMISSION LINES. PART 2: EXPERIMENTAL RESULTS Final Technical Report
Clayton R. Paul Mar. 1974 229 p
(Contract F30602-72-C-0418)
(AD-780039/4; RADC-TR-74-61-Pt-2) Avail: NTIS HC $7.50 CSCL 09/1

The unintentional coupling of energy between wires in cable bundles which connect electronic subsystems is an important source of interference on aircraft, missiles, and ground systems. In the prediction of intrasystem electromagnetic compatibility in recent years, more reliance is being placed on computer code and within these codes, models are required for predicting the wire coupled interference. It is the purpose of the report to investigate the prediction of wire-to-wire coupling. The experimental results are presented. Author (GRA)

N75-14051# Hughes Aircraft Co., Torrance, Calif. Electron Dynamics Div.
BROADBAND TRANSMITTER TUBE Final Report, 1 Jul. 1972 - Jul. 1974
A. E. Manoly Oct. 1974 88 p
(Contract DAAB07-72-C-0294)
(AD-786617; EDD-W-5262; ECOM-72-0294-F) Avail: NTIS CSCL 09/1

The objectives of the program are to determine the feasibility of multiple-coupled slow wave structures interacting with multiple beams in a single traveling-wave tube. The device shall be designed for high output power over a broad instantaneous frequency range. Also desired is a high continuous wave RF output power capability, resonable saturated gain and efficiency levels suitable for electronic warfare applications. Cold test data were taken for various dual-helix circuit structures. Dual beam electron gun design studies were performed. A figure 8 circuit and a dual beam gun were successfully combined into a tube and three 660H traveling-wave tubes were built. Theoretical and experimental electron gun design studies were made for Ku-band. The Ku-band circuit design and cold test were completed. GRA

N75-14052# Avantek, Inc., Santa Clara, Calif.
PRODUCTION ENGINEERING MEASURE FOR MICROWAVE TRANSISTORS USING PROTON ENHANCED DIFFUSION TECHNOLOGY Quarterly Report, 1 Oct. 1973 - 1 Jan. 1974
Harry F. Cooke 1 Jan. 1974 54 p ref
(Contract DAAB05-73-C-2061)
(AD-786779; A-74-02; QR-2) Avail: NTIS CSCL 09/1

During the period covered by the report, continued improvements in Proton-Enhanced Diffusion (PED) processing were realized including a method for delineating the full base profile. The thermal resistance tests were completed with measurements made on a thermal microscanner. Results showed that the new thermal resistance test set gave accurate results and that PED does not affect thermal resistance. The second set of engineering samples was completed and delivered. Average noise figure was better than specification on both types shipped. (Modified author abstract) GRA

N75-14053# Army Foreign Science and Technology Center, Charlottesville, Va.
SEMICONDUCTOR DIODES AND TRANSISTORS HANDBOOK, SECOND EDITION
N. N. Goryunova 13 Aug. 1974 481 p refs Transl. into ENGLISH of unidentified RUSSIAN language book, Moscow, 1968 352 p
(AD-786811; FSTC-HT-23-814-74) Avail: NTIS CSCL 09/1

The semiconductor diode and transistor guidebook lists the currently manufactured semiconductor devices within the Soviet realm of production. A cursory glance at the basic solid-state theory occupies the first part of the book. The remainder of the book is made up of first-generation semiconductors, e.g. germanium diodes, silicon stabilitrons, SCRs and several species of transistors. Omitted from this guidebook is any mention of ICs, either SSI or MSI; also missing are FETs. GRA

N75-14054# General Electric Co., Schenectady, N.Y.
CRYOGENIC SYSTEMS AND SUPERCONDUCTIVE POWER Final Technical Report, 1 Oct. 1973 - 16 Jul. 1974
B. D. Hatch, J. D. Hurley, D. W. Jones, and E. T. Laskaris 16 Jul. 1974 90 p refs
(Contract DAHC15-72-C-0235; ARPA Order 2200)
(AD-786156; GE-SRD-74-080) Avail: NTIS CSCL 09/3

Extreme environments are a common requirement of military applications of propulsion machinery. It is essential that superconductive propulsion systems for ships and military vehicles be of rugged and highly reliable construction. For this reason, dominant emphasis has been given during Phase III to shock and vibration testing of representative superconductive coils while operating in a superconducting mode near the upper current density limit. Supplementary tests have also been made to determine structural and mechanical properties of materials applicable to the composite material of the superconductive coil while at liquid helium temperatures. The second area of experimental evaluation conducted during Phase III involved liquid metal collectors for acyclic superconductive machines in which gallium is used as the liquid metal. These tests have been conducted to identify potential materials and process problem areas and to demonstrate the potential resolution of such problems. Author (GRA)

N75-14055# Colorado Univ., Boulder. Dept. of Electrical Engineering.
VARIABLE SPEED COMMUTATORLESS ENERGY CONVERTERS Final Report, Sep. 1971 - Dec. 1973
Edward A. Erdelyi and David A. Remington Dec. 1973 208 p refs
(Contract DAAK02-70-C-0244)
(AD-786005) Avail: NTIS CSCL 09/3

The theory of three phase squirrel cage induction motors supplied by chopped d.c. supplies is developed. The differential equations are solved by a fourth order Runge-Kutta method explained in the appendix. The waveform of the applied voltage is either square of staircase in shape. The numerical method, specially modified for the application, yields the following results: (a) Current waveshapes in the stator when square wave voltages of 20 Hz to 120 Hz, and stepped wave voltages of 30 to 100 Hz, are applied to the stator terminals. (b) The torque variations at different loads and frequencies. (c) The slip variations at different loads and frequencies. (Modified author abatract) GRA

N75-14056# Army Foreign Science and Technology Center, Charlottesville, Va.
EQUIVALENT CIRCUIT PARAMETERS OF MICROWAVE POWER TRANSISTORS AT HIGH INJECTION LEVELS
I. P. Nikolaevskii, V. V. Polevoi, and E. P. Sorokin 16 Apr. 1974 14 p refs Transl. into ENGLISH from Poluprov. Prib. Ikh Primen., Sb. Statei (Moscow), no. 24, 1970 p 42-51
(AD-786038; FSTC-HT-23-1572-73) Avail: NTIS

Circuit parameters are derived for a high-frequency planar drift power transistor. In determining low-signal parameters, the inductances of transistor base, emitter, and collector and the parasitic reactive elements of the measuring circuits are critical. GRA

N75-14057# Rockwell International Corp., Cedar Rapids, Iowa. Collins Radio Group.
NOISE PROPERTIES OF A VHF POWER AMPLIFIER THEORY AND EXPERIMENT Final Report, 19 Jan. 1972 - 20 May 1974
R. E. Post, Won K. Choi, and D. B. Hallock Jun. 1974 76 p refs Prepared in cooperation with Iowa State Univ.
(Contract DAAB07-72-C-0113; DA Proj. 1S7-62701-AH-92)
(AD-786558; ECOM-0113-F-72) Avail: NTIS CSCL 09/5

A study has been made to determine the mechanism of noise generation in VHF power amplifiers and oscillators in the

54- to 80-MHz range. Primary emphasis was placed on those amplifiers operating in the highly efficient Class D or switching mode whose instantaneous collector voltage is at or above the breakdown region. A primary result of the study is that the predominant source of output noise is avalanche multiplication in the collector-base region. A mathematical basis for predicting the static noise power has been developed, which shows good agreement with measurements made at 70 MHz on an amplifier covering the 54- to 80-MHz region with 40-watt output capability. Some special noise measurement test equipment was also developed during the study to facilitate accurate noise power measurements to within 5 percent away from the carrier frequency. Further work in this area is needed to correlate the dynamic noise power to transistor parameters. Improved techniques are also required to obtain parameters for the noise model with sufficient accuracy to characterize the avalanche process. Author (GRA)

N75-14058# Army Foreign Science and Technology Center, Charlottesville, Va.
THERMAL INTERACTION IN INTEGRATED CIRCUITS
D. I. Zaks and N. M. Naumov 9 Apr. 1974 18 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Radioelektron. (Ukrainia), v. 14, no. 11, 1971 p 1304-1311
(AD-785985; FSTC-HT-23-1664-73) Avail: NTIS CSCL 09/5

Interactions take place in integrated circuits between the thermal and electrical fields (thermal interaction). This phenomenon, frequently degrading the operation of semiconductor instruments, can be used for creation of low frequency range integrated circuits. Several examples of such circuits and models of them are examined. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N75-14059*# Scientific Translation Service, Santa Barbara, Calif.
PROBLEMS ASSOCIATED WITH NOISE MEASUREMENTS IN AIRFLOWS
P. Gamba Washington NASA Dec. 1974 31 p refs Transl. into ENGLISH from a French paper
(Contract NASw-2483)
(NASA-TT-F-16069) Avail: NTIS HC $3.75 CSCL 20D

Studies of the interrelation of turbulent pressure and velocity fluctuations at a given point in a flow are shown to lead to a formal analogy between sound pressure waves and 'pseudowaves' of turbulent pressure. A review of recent research on the response of a microphone placed in a silent laminar airflow is followed by a discussion of the problem of estimating the noise within a flow on the basis of external noise measurements. Author

N75-14060*# General Dynamics/Convair, San Diego, Calif.
LOW-G FLUID BEHAVIOR TECHNOLOGY SUMMARIES
J. A. Stark, R. D. Bradshaw, and M. H. Blatt Dec. 1974 333 p refs
(Contract NAS3-17814)
(NASA-CR-134746; CASD-NAS-74-066) Avail: NTIS HC $9.50 CSCL 20D

This report presents a summarization and categorization of the pertinent literature associated with low-g fluid behavior technology. Initially a literature search was conducted to obtain pertinent documents for review. Reports determined to be of primary significance are summarized in detail. Each summary, where applicable, consists of; (1) report identification, (2) objective(s) of the work, (3) description of pertinent work performed, (4) major results, and (5) comments of the reviewer (GD/C). Pertinent figures are presented on a single facing page separate from the text. Specific areas covered are; interface configuration, interface stability, natural frequency and damping, liquid reorientation, bubbles and droplets, fluid inflow, fluid outflow, convection, boiling and condensation heat transfer, venting effects, and fluid properties. Reports which were reviewed and not summarized, along with reasons for not summarizing, are also listed. Cryogenic thermal control and fluid management systems technology are presented. Author

N75-14061*# General Dynamics/Convair, San Diego, Calif.
CRYOGENIC THERMAL CONTROL TECHNOLOGY SUMMARIES
J. A. Stark, K. E. Leonhard, and F. O. Bennett, Jr. Dec. 1974 137 p refs
(Contract NAS3-17814)
(NASA-CR-134747; CASD-NAS-74-067) Avail: NTIS HC $5.75 CSCL 20D

A summarization and categorization is presented of the pertinent literature associated with cryogenic thermal control technology having potential application to in-orbit fluid transfer systems and/or associated space storage. Initially, a literature search was conducted to obtain pertinent documents for review. Reports determined to be of primary significance were summarized in detail. Each summary, where applicable, consists of; (1) report identification, (2) objective(s) of the work, (3) description of pertinent work performed, (4) major results, and (5) comments of the reviewer (GD/C). Specific areas covered are; (1) multilayer insulation of storage tanks with and without vacuum jacketing, (2) other insulation such as foams, shadow shields, microspheres, honeycomb, vent cooling and composites, (3) vacuum jacketed and composite fluid lines, and (4) low conductive tank supports and insulation penetrations. Reports which were reviewed and not summarized, along with reasons for not summarizing, are also listed. Author

N75-14062*# General Dynamics/Convair, San Diego, Calif.
FLUID MANAGEMENT SYSTEMS TECHNOLOGY SUMMARIES
J. A. Stark, M. H. Blatt, F. O. Bennett, and B. J. Campbell Dec. 1974 288 p refs
(Contract NAS3-17814)
(NASA-CR-134748; CASD-NAS-74-068) Avail: NTIS HC $8.75 CSCL 20D

A summarization and categorization of the pertinent literature associated with fluid management systems technology having potential application to in-orbit fluid transfer and/or associated storage are presented. A literature search was conducted to obtain pertinent documents for review. Reports determined to be of primary significance were summarized in the following manner: (1) report identification, (2) objective(s) of the work, (3) description of pertinent work performed, (4) major results, and (5) comments of the reviewer. Pertinent figures are presented on a single facing page separate from the text. Specific areas covered are: fluid line dynamics and thermodynamics, low-g mass gauging, other instrumentation, stratification/pressurization, low-g vent systems, fluid mixing refrigeration and reliquefaction, and low-g interface control and liquid acquisition systems. Reports which were reviewed and not summarized, along with reasons for not summarizing, are also listed. Author

N75-14063# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
DRAG AND SEPARATION
Maurice Sirieix 1973 23 p refs In FRENCH; ENGLISH summary
(TP-1231; AGARD-CP-124) Avail: NTIS HC $3.25

After describing the unsteady character of some separated flows and their resulting effects, a definition was given of different sorts of turbulent separated flows and their usual quasi-steady character. The expected effects of these separated flows on the drag are studied and the available theoretical methods of prediction are briefly described. Miscellaneous examples in which these separated flows appear are then analyzed. Author

N75-14064# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AN INVESTIGATION OF DIFFERENT TECHNIQUES FOR UNSTEADY PRESSURE MEASUREMENTS IN COMPRESSIBLE FLOW AND COMPARISON WITH LIFTING SURFACE THEORY
Roger Destuynder and Henry Tijdeman (National Lucht-en Ruimtevaartlaboratorium) 1974 26 p

(TP-1328; AGARD-R-617) Avail: NTIS HC $3.75

An investigation was made of a swept wing oscillating in subsonic flow. The primary objective of the investigation was to compare two different techniques for unsteady pressure measurements: (1) in-situ micro miniature pressure transducers, and (2) measurements through pressure tubes and scanning valves. In addition, experimental data were required to verify the results of lifting surface theory in compressible flow. Data are also given on the following: measurements of overall moment derivatives, flutter test on the same model with a modified suspension, and flutter calculations with both purely theoretical aerodynamics and semi-empirical aerodynamic forces derived from the measured unsteady pressure distributions. Author

N75-14065*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ANALYSIS OF THE DYNAMIC RESPONSE OF A SUPERSONIC INLET TO FLOW-FIELD PERTURBATIONS UPSTREAM OF THE NORMAL SHOCK

Gary L. Cole and Ross G. Willoh Washington Jan. 1975 38 p refs

(NASA-TN-D-7839; E-7969) Avail: NTIS HC $3.75 CSCL 20D

A linearized mathematical analysis is presented for determining the response of normal shock position and subsonic duct pressures to flow-field perturbations upstream of the normal shock in mixed-compression supersonic inlets. The inlet duct cross-sectional area variation is approximated by constant-area sections; this approximation results in one-dimensional wave equations. A movable normal shock separates the supersonic and subsonic flow regions, and a choked exit is assumed for the inlet exit condition. The analysis leads to a closed-form matrix solution for the shock position and pressure transfer functions. Analytical frequency response results are compared with experimental data and a method of characteristics solution. Author

N75-14066*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

DIFFUSION ALGORITHMS AND DATA REDUCTION ROUTINE FOR ONSITE LAUNCH PREDICTIONS FOR THE TRANSPORT OF TITAN 3 C EXHAUST EFFLUENTS

J. Briscoe Stephens and P. A. Hamilton Washington Dec. 1974 86 p refs

(NASA-TN-D-7862) Avail: NTIS HC $4.75 CSCL 20D

The NASA/MSFC multilayer diffusion algorithms have been specialized for the prediction of the surface impact for the dispersive transport of the exhaust effluents from the launch of a Titan 3 vehicle. This specialization permits these transport predictions to be made at the launch range in real time so that the effluent monitoring teams can optimize their monitoring grids. Basically, the data reduction routine requires just the meteorology profiles for the thermodynamics and kinematics of the atmosphere as an input. These profiles are graphed along with the resulting exhaust cloud rise history, the center line concentrations and dosages, and the hydrogen chloride isopleths. Author

N75-14067*# Alabama Univ., Huntsville. School of Graduate Studies and Research.

PRESSURE DROP ACROSS WOVEN SCREENS UNDER UNIFORM AND NONUNIFORM FLOW CONDITIONS Final Report

Mike Ludewig, Satoaki Omori, and Ganti L. Rao Oct. 1974 143 p refs

(Contract NAS8-28736)

(NASA-CR-120559) Avail: NTIS HC $5.75 CSCL 20D

Tests were conducted to determine the experimental pressure drop and velocity data for water flowing through woven screens. The types of materials used are dutch twill and square weave fabrics. Pressure drop measures were made at four locations in a rectangular channel. The data are presented as change in pressure compared with the average entry velocity and the numerical relationship is determined by dividing the volumetric flow rate by the screen area open to flow. The equations of continuity and momentum are presented. A computer program listing an extension of a theoretical model and data from that computer program are included. Author

N75-14068*# Bell Aerospace Co., Buffalo, N.Y.

STUDY OF THE EFFECTS OF FUEL VORTEX FILM COOLING ON HIGH TEMPERATURE COATING DURABILITY Final Report

Jul. 1974 98 p refs

(Contract NAS9-12996)

(NASA-CR-141450; Rept-8701-910045) Avail: NTIS HC $4.75 CSCL 20D

A report on the effects of fuel vortex film cooling on high temperature coating durability is presented. The program evaluated candidate high temperature oxidation resistant reaction control system engine thrust chamber material. As a result of the evaluation, the current and future programs may be optimized from the materials standpoint. Engine firing data for the evaluation of one material system is generated. The subjects considered are: (1) screening of materials, (2) thrust chamber fabrication, (3) engine testing, and (4) analysis of the data. Author

N75-14069# Technische Universitaet, Hanover (West Germany).

INDUCTIVE FLOW MEASUREMENTS ON MIXED CONDUCTIVITY AND ISOLATING FLUIDS Ph.D. Thesis [UEBER INDUKTIVE DURCHFLUSSMESSUNG MISCHLEITENDER UND ISOLIERENDER FLUESSIGKEITEN]

Rainer Hentschel 1973 111 p refs In GERMAN

Avail: NTIS HC $5.25

An electromagnetic induction flowmeter for independent measurements of flow volume is reported. An array with potential controlled electrodes provides for analog distribution of electric field strength in the measured flow region, and feedback control insures compensation for flow impedance and random noise.

Transl. by G.G.

N75-14070# Technische Universitaet, Munich (West Germany).

THE EFFECTS OF PRESSURE AND GEOMETRY ON HEAT TRANSFER DURING CONTAINER BOILING NEAR THE CRITICAL POINT Ph.D. Thesis [DER EINFLUSS DES DRUCKES UND DER GEOMETRIE AUF DEN WAERMEUEBERGANG BEIM BEHAELTERSIEDEN NAHE DEM KRITISCHEN PUNKT]

Guntram Feurstein 11 Mar. 1974 99 p refs In GERMAN

Avail: NTIS HC $4.75

Measurements on various fluids and heating surfaces were performed in order to determine effects of pressure and surface geometry on heat transfer up to the critical point. Poll boiling heat transfer was studied during natural convection and in bubble and film boiling on heated platinum wires in carbon dioxide, Frigen 13, and Frigen 23 at saturation. Heat transfer increased in free convection flow and during bubble boiling with increased heating current density and at constant saturation pressure in relation to decreasing wire diameter. Minimal heating current density decreased with increasing wire diameter as well as under increased saturation pressure. Transl. by G.G.

N75-14071# Institut de Mecanique des Fluides de Marseille (France).

SUPERSONIC TURBULENT BOUNDARY LAYER IN THE SYMMETRY PLANE OF A CONE AT INCIDENCE

Bernard Roux and Patrick Bontoux 7 Nov. 1974 29 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Jun. 1975

Avail: NTIS HC $3.75

Similarity variables are compared for the zero incidence case by referencing to an exact solution which is obtained by a finite difference method. A similarity variable is then used to solve the boundary layer equations in the symmetry plane of a cone at incidence. The calculations are performed for a sharp cone at incidence in a supersonic flow considering a wide range of Reynolds number values. The calculated results allow for emphasizing the influence of this last parameter on the longitudinal and azimuthal characteristic properties of the boundary layer.

Author

N75-14072# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.

KINETIC APPROACH TO THE EVAPORATION AND CONDENSATION PROBLEM

Masahide Murakami and Koichi Oshima Nov. 1974 31 p refs

(ISAS-518-Vol-39-No-15) Avail: NTIS HC $3.75

Phenomena caused in a vapor gas concerning evaporation from, or condensation onto a liquid (or solid) surface in contact with its pure vapor are investigated by using the Monte Carlo method. The formation of the Knudsen layer adjacent to the interphase and the growth of the hydrodynamic or continuum region outside the layer as time advances are simulated based on the kinetic theory of gases. The results are found to simulate these phenomena with sufficient accuracy. It is shown that there are two possible types of the transient developments of the vapor field according to the physical property of the evaporating substance. Several physical quantities in the hydrodynamic region in a quasi-steady state are computed and compared with a number of analytical and experimental data. The agreement of the present results with them is qualitatively satisfactory. A set of the slip condition at the interphase is presented to give the boundary conditions at the phase surface in hydrodynamic approaches. It is confirmed that the kinematic effects of binary collisions among vapor molecules on the mass flux rate are not so serious except in the case of very strong evaporation. Author

N75-14073*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

DESIGN OF EXPERIMENTS FOR MEASURING HEAT-TRANSFER COEFFICIENTS WITH A LUMPED-PARAMETER CALORIMETER

G. James VanFossen, Jr. Washington Jan. 1975 20 p refs Prepared in cooperation with Army Air Mobility Research and Development Lab., Cleveland

(NASA-TN-D-7857; E-8104) Avail: NTIS HC $3.25 CSCL 20M

A theoretical investigation was conducted to determine optimum experimental conditions for using a lumped-parameter calorimeter to measure heat-transfer coefficients and heating rates. A mathematical model of the transient temperature response of the calorimeter was used with the measured temperature response to predict the heat-transfer coefficient and the rate of heating. A sensitivity analysis was used to determine the optimum transient experiment for simultaneously measuring the heat addition during heating and the convective heat-transfer coefficient during heating and cooling of a lumped-parameter calorimeter. Optimum experiments were also designed for measuring the convective heat-transfer coefficient during both heating and cooling and cooling only. Author

N75-14074# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Inst. fuer Turbulenzforschung.

COHERENT STRUCTURES IN TURBULENCE

10 Jun. 1974 61 p refs Colloq. held at Southampton, Engl., 25-29 Mar. 1974

(DLR-Mitt-74-25) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 24 DM

Experimental and theoretical results are presented in connection with the jet noise problem caused by turbulence. Fourier analysis was applied to circumferentially coherent pressure fluctuations. The flow field structure of a sound-influenced free jet was investigated to verify results of stability theories. An ordinary differential equation was solved for the pulsating motion of a thin free shear layer in an incompressible fluid along a semi-infinite plate. Results of a stability calculation are presented for velocity profiles which had been measured in turbulent circular jets. For individual titles, see N75-14075 through N75-14078.

N75-14075 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany).

ANALYSIS OF CIRCUMFERENTIALLY COHERENT PRESSURE FLUCTUATIONS RELEVANT TO JET NOISE

H. V. Fuchs *In its* Coherent Struct. in Turbulence 10 Jun. 1974 p 7-20 refs (For availability see N75-14074 05-34)

Power spectra of the lower-order azimuthal constituents of the fluctuating jet pressure field are presented. They result from a Fourier decomposition of narrowband circumferential space correlations employing static pressure probes. The relevance of the pressure cross spectra to the noise from turbulence mean shear interactions was worked out from Michalke's expansion scheme. It is shown that the m = 0,1,2,3 constituents dominate in the turbulent pressure field in the range of Strouhal numbers between 0.1 to 1.0 where the bulk of the acoustic energy is known to be radiated. The variation of these lower order azimuthal constituents with radial distance from the jet axis and with axial distance from the nozzle exit was determined throughout the conjectural source region for jet noise. Author (ESRO)

N75-14076 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany).

ON THE STRUCTURE OF VELOCITY AND PRESSURE FLUCTUATIONS IN A SOUND-INFLUENCED FREE JET

E. Pfizenmaier *In its* Coherent Struct. in Turbulence 10 Jun. 1974 p 21-43 refs (For availability see N75-14074 05-34)

The flow field structure of a sound-influenced free jet was studied to verify results of stability theories. Phase velocities of the amplified disturbances were predicted, exceeding the mean jet velocity for low Strouhal numbers. These ultra rapid waves can in fact be traced experimentally. The occurence of standing wave patterns at higher Strouhal numbers is explained by a model of two downstream traveling waves of the same frequency but with different speeds. One wave is due to the exciting sound wave, and the other represents the excited instability wave. Author (ESRO)

N75-14077 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany).

THE CONTROL OF A FREE SHEAR LAYER STARTING FROM A SEMI-INFINITE PLATE BY A PULSATING MONOPOLE OR DIPOLE. SOME NEW ANALYTICAL SOLUTIONS OBTAINED FROM INCOMPRESSIBLE THEORY

D. Bechert and U. Michel *In its* Coherent Struct. in Turbulence 10 Jun. 1974 p 45-53 ref (For availability see N75-14074 05-34)

By considering a line source distribution along a thin free shear layer, an inhomogeneous ordinary differential equation for the pulsating motion of the shear layer was derived for an incompressible fluid. A general solution of this equation is given. In the case of a shear layer starting from a semi-infinite plate, only such motions can exist which are forced by external pulsating fields. Solutions for some special external fields are given. Author (ESRO)

N75-14078 Technische Univ., Berlin (West Germany).

ON THE INSTABILITY OF THE TURBULENT JET BOUNDARY LAYER

A. Michalke *In* DFVLR Coherent Struct. in Turbulence 10 Jun. 1974 p 55-61 refs (For availability see N75-14074 05-34)

A stability calculation is presented for velocity profiles which were measured in turbulent circular jets. The coherent structure of jet turbulence can be explained by means of unstable axisymmetric and azimuthal disturbances. It is found theoretically that beyond a Mach number of 0.8 the first azimuthal disturbance is always more amplified than the axisymmetric one. This suggests a significant influence of the Mach number on the coherent structure of jet turbulence. Author (ESRO)

N75-14079# Sandia Labs., Albuquerque, N.Mex.

BASE PRESSURE AND HEAT TRANSFER MEASUREMENTS ON A SLENDER REENTRY VEHICLE AT FREE STREAM MACH 18

B. M. Bulmer Jul. 1974 19 p refs

(Contract AT(29-1)-789)

(SAND-74-56) Avail: NTIS HC $3.25

This report analyzes flight-test base data obtained from a slightly blunted 9-degree cone in hypersonic entry conditions. Data are limited to pressure measurements in laminar flow and heat-transfer measurements in turbulent-flow conditions. The data analyses include correlation with slender cone flight-test data and comparison with near-wake theory. Comparisons of the present results with published data correlations emphasize the Reynolds-number dependence of laminar base pressure and the various factors that influence turbulent base heating in hypersonic flow. NSA

N75-14080# California Univ., Livermore. Lawrence Livermore Lab.

MODIFICATION OF THE GRAY EQUATION OF STATE IN THE LIQUID-VAPOR REGION

D. A. Young 15 Apr. 1974 32 p refs

(Contract W-7405-eng-48)
(UCRL-51575) Avail: NTIS HC $3.75

A modification of the GRAY three phase equation of state is described. This modification permits accurate calculation of the pressure in the mixed phase liquid-vapor region. A listing of the computer code modification is given along with a listing of two phase region parameters for sixteen metals. Plots of the modified equation of state are also presented. Author (NSA)

N75-14081# Technische Univ., Berlin (West Germany). Inst. fuer Kerntechnik.

ANALYSIS OF STEADY-STATE FORCED CONVECTIVE TURBULENT HEAT TRANSFER IN CONCENTRIC ANNULI WITH ARBITRARILY VARYING BOUNDARY CONDITIONS OF SECOND KIND Ph.D. Thesis

D. Gaertner Apr. 1974 247 p refs In GERMAN; ENGLISH summary
(NP-20071) Avail: AEC Depository Libraries HC $15.50

Turbulent flow heat transfer in concentric annuli is analyzed for the general three-dimensional case in which the wall heat flux varies arbitrarily in both the circumferential and axial directions. The assumptions are those of steady, incompressible, constant-property, fully developed flow of Newtonian fluids in smooth concentric circular annuli. Asymptotic expansions were developed to determine the higher eigenvalues and eigenfunctions. Solutions include the limiting cases with respect to channel geometry (circular tube, plane duct) as well as Reynolds-number (laminar flow, slug flow). Extensive comparison with experimental results is performed for the following boundary conditions: thermally fully developed situation (heat flux independent of axial direction) at circumferentially both constant and varying heat flux; and entrance heat transfer at circumferentially constant and axially both constant and varying heat flux. Agreement was found at both low and high Prandtl numbers. The effect of a spacially varying heat flux distribution on temperature distribution is demonstrated. NSA

N75-14082# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. Systemes Balistiques et Spatiaux.

IME-D STUDY FOR A REVISED THERMAL CONTROL. PHASE 1: CRITERIA FOR THE SELECTION OF SOLUTION (VOLUMES 1 AND 2) Final Report

10 Oct. 1973 69 p
(Contract ESTEC-1998/73-PP)
(Doc-267-CA/61-Vol-1; ESRO-CR(P)-500-Vol-1; Doc-267-CA/61-Vol-2; ESRO-CR(P)-500-Vol-2) Avail: NTIS HC $4.25

A thermal concept for the IME-D satellite is described. The proposed passive thermal system with remotely controlled heaters satifies the requirements for the satellite. The use of louvers or shutters is not necessary. A conductive and radiative thermal insulation is foreseen between the satellite core and the external surfaces. The thermal control surface is adapted in order to maintain roughly 20 C inner mean temperature for the good functioning of equipment. A power budget was derived using a mathematical model. ESRO

N75-14083# Societe Nationale Industrielle Aerospatiale, Cannes (France). Div. Systemes Balistiques et Spatiaux.

IME-D STUDY FOR A REVISED THERMAL CONTROL. PHASE 2: THERMAL ANALYSIS OF THE SELECTED DESIGN Interim Report

8 Nov. 1973 50 p
(Contract ESTEC-1998/73-PP)
(Doc-277-CA/61; ESRO-CR(P)-501) Avail: NTIS HC $3.75

Basic criteria were established permitting orientation of the choice of the thermal concept for the IME-Daughter satellite. Various advantages and inconveniences for each envisaged configuration were determined in order to decide on a project orientation towards either a purely passive thermal concept or an active thermal concept with louvers. Available data permit selection of a purely passive thermal control system for a basic configuration. Taking into account missing data, in particular the shunt, a backup solution using louver systems is considered. ESRO

N75-14084# Nederlands Scheeps-Studiecentrum TNO, Delft. Afdeling voor Scheepsbouw.

WAVES INDUCED MOTIONS AND DRIFT FORCES ON A FLOATING STRUCTURE

R. Wahab (Inst. TNO for Mech. Construct.) Mar. 1974 26 p refs
(DCK-64645; Rept-186-S) Avail: NTIS HC $3.75

A method is given for computing the wave induced motions and drift force of a floating drilling rig in regular waves of arbitrary direction. The effect of current is included. The drilling rig is assumed to be composed of tubular parts and three dimensional footings of which the dimensions are small compared with the wave length. The mutual interaction between these components is neglected. With regard to the motions, the results of calculations show good agreement with experimentally determined values for the model. The agreement between the calculated viscous drift force and the drift force as determined from the measured anchor forces on the model is good, although more accurate measurements are needed. Author

N75-14085# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Freiburg (West Germany). Inst. fuer Angewandte Mathematik und Mechanik.

A PHOTOGRAMMETRIC METHOD FOR MEASURING THREE-DIMENSIONAL VELOCITY FIELDS IN A FLOW VISUALIZED BY HYDROGEN BUBBLES

Hans Bippes 14 May 1974 53 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-37) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 18,50 DM

A method to measure the magnitude and the direction of flow velocities is described. For this purpose the velocity field was visualized by the hydrogen bubble method and photographed with a stereometric camera. By photogrammetric evaluation of doubly exposed photographs the vectorial distance between the two positions of the same bubbles at the successive exposures may be found. An estimate was also made as to the possible difference between the measured and actual flow speeds. The photogrammetric procedure used and the design concept of a specially built stereometric camera are also discussed.
Author (ESRO)

N75-14086# Washington Univ., Seattle.

NUMERICAL STREAM LINE APPROACH TO FREE SURFACE PROBLEMS

Carl E. Pearson 31 Dec. 1973 27 p refs
(Contract N00014-67-A-0103-0028; NR Proj. 062-475)
(AD-785927) Avail: NTIS CSCL 20/4

A numerical method, based on the iteration of stream line positions, is described for incompressible inviscid (but not necessarily irrotational) steady flow with a free surface. The method is accurate and efficient, and appears susceptible of generalization. Author (GRA)

N75-14087# Army Foreign Science and Technology Center, Charlottesville, Va.

THE INDUCTOR-PRODUCT SYSTEM AS A CONTROL OBJECT FOR INDUCTIONAL CONTINUOUSLY SUCCESSIVE HEATING

N. E. Razorenov 10 Dec. 1973 10 p refs Transl. into ENGLISH from Inzh. Fiz. Zh. (Minsk), v. 20, no. 3, 1971 p 476-480
(AD-785982; FSTC-HT-23-1425-73) Avail: NTIS CSCL 13/8

The article considers a method for the analytical description of the transfer functions of a regulated object during inductional continuous-sequential heating in inductors of finite length. Fast technological processes of hot plastic deformation, thermal treatment and the welding of metals with the inductional continuous-sequential heating (ICSH) with built-in control and regulating systems (CRS) for the temperature regimes with the aid of photoelectric temperature sensors are widely used in metallurgy and machine building. When such systems are designed, it is necessary to have a mathematical description of the regulated object, i.e., the transfer functions which relate the temperature of the product at the output of the inductor to the main controlling and perturbing actions. GRA

N75-14088# Naval Research Lab., Washington, D.C.

COLLAPSE OF PARTIALLY MIXED REGIONS IN STRATIFIED FLUIDS Interim Report

J. P. Dugan, A. C. Warn-Varnas, and S. A. Piacsek Jul. 1974 19 p refs

(ARPA Order 2152; NRL Proj. 77K03-54; WF11125703)
(AD-786355; NRL-MR-2841) Avail: NTIS CSCL 20/4

The collapse of a partially mixed fluid mass immersed in a stably stratified fluid is studied with a finite difference formulation of the Navier-Stokes equations. In a series of tests, the mixed region is assumed to have various types of density structure including ones derived from both uniform and nonuniform amounts of mixing. The shape of the mixed region is followed in detail. The temporal history of the width of the mixed region agrees with a simple analytical model in the initial stage of collapse in the case where the amount of mixing is uniform. It also compares well with a previous analytical theory in the case of a small amount of mixing where that theory is valid. Most of the energy stored in the mixed region is given up to the surrounding fluid in one Brunt-Vaisala period. Author (GRA)

N75-14089# Naval Research Lab., Washington, D.C.
NRL MODIFIED VERSION OF CINDA-3G PROGRAM Final Report
Mary E. Gealy 22 Aug. 1974 207 p
(AD-786351; NRL-7656) Avail: NTIS CSCL 20/13

A programming manual has been prepared for the thermal analyzing program, CINDA. The program's options offer the user a variety of methods for solution of thermal analog models presented to it in a network format. The network representation of the thermal problem is unique in that it has a one-to-one correspondence to both the physical model and the mathematical model. This analogy enables engineers quickly to construct mathematical models of complex thermophysical problems and prepare them for program input. In addition, the program contains numerous subroutines for handling interrelated complex phenomena such as sublimation; diffuse radiation within enclosures; simultaneous, one-dimensional, incompressible fluid flow including valving and transport delay effects; etc. It can handle all three types of heat transfer--conduction, convection, and radiation. (Modified author abstract) GRA

N75-14090# Army Air Mobility Research and Development Lab., Moffett Field, Calif. Ames Directorate.
NUMERICAL SIMULATION OF TRANSONIC FLOW ABOUT AIRPLANES AND HELICOPTER ROTORS
W. F. Ballhaus and F. X. Caradonna 1973 16 p refs
(AD-785605) Avail: NTIS CSCL 20/4

Most modern aircraft achieve optimum cruise performance and maneuverability when flying at high subsonic Mach numbers in the transonic regime. As the Mach number increases beyond the optimum, the extent and strength of these shock waves increases, and performance deteriorates rapidly giving way to flow separation and buffet. Predictions of in-flight performance for new configurations are often unreliable. It seems to attempt to use numerical simulations to supplement wind tunnel tests whenever possible. This method is discussed. (Modified author abstract) GRA

N75-14091# Army Foreign Science and Technology Center, Charlottesville, Va.
PROBLEMS OF CONSTRUCTING CONTROL DEVICES WITH SMST-2 MODULES
I. V. Vaiser, Yu. V. Vanskii, A. M. Kasimov, V. M. Yarol, and V. F. Skvortsov 1 Apr. 1974 14 p refs Transl. into ENGLISH From the 4th Intern. Fluidics Conf., Paper F-2 (Varna), 14-18 Oct. 1972 8 p
(AD-785949; FSTC-HT-23-1643-73; Paper-F-2) Avail: NTIS CSCL 13/7

Practical applications of the digital fluidic SMST-2 modules are described. The principles of construction of the fluidic modules and communication panels, performance values, supply networks, and the choice of design solution ensuring the standardization of devices are discussed. Module fabrication is outlined. GRA

N75-14092# West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
LAMINAR SEPARATED FLOW OVER NONLIFTING ELLIPSES
Nathan Ness, Yang-Tai Thomas Lin, and Hsin-Fuh Wang Jul. 1974 77 p refs
(Contract N00014-68-A-0512; NR Proj. 215-163)
(AD-786223; TR-41) Avail: NTIS CSCL 20/4

A theory is presented for the laminar separated flow over nonlifting ellipses as a function of thickness/chord ratio (t/c) and free stream Reynolds number. The theory includes the separated flow over a circular cylinder as the special case when (t/c) = 1. The theory involves a coupling of inviscid and viscous flow through a search method. The inviscid analysis provides the pressure which is used in the boundary layer program to locate the boundary layer separation points. Convergence occurs when the boundary layer separation points are equal to the assumed inviscid separation points. (Modified author abstract) GRA

N75-14093# McDonnell-Douglas Astronautics Co., Titusville, Fla.
RELIABILITY TESTING OF LAMINAR JET FLUIDIC ELEMENTS Final Report
W. J. Westerman and R. E. Wright 1 Jun. 1974 69 p ref
(Contract DAAG39-72-C-0001)
(AD-785755; L0266) Avail: NTIS CSCL 13/7

Laminar jet fluidic elements were evaluated for the Harry Diamond Laboratories as a supplement to Contract No. DAAG39-72-C-0001. An evaluation of results is presented and compared to performance of turbulent elements tested under the basic contract. A comprehensive photographic presentation of contamination buildup is included. The program encompassed a total of 24 elements investigated of which 16 were proportional and 8 were bistable. GRA

N75-14094# Maryland Univ., College Park.
HEAT PIPE SYMPOSIUM/WORKSHOP
D. K. Anand Nov. 1973 43 p refs Symp. held at College Park, Md., 5-6 Nov. 1973
(Grant NSF GK-38697)
(PB-236008/9) Avail: NTIS HC $3.75 CSCL 13A

The report describes results of a workshop meeting on research and technological development associated with heat pipe devices. Participants included representatives from industry, universities and government. The meeting was devoted to an assessment of the state-of-the-art of this field and the identification of needs and opportunities that can be effectively pursued through research. Topics discussed include fundamentals, wick properties and performance, fabrication, cryogenic heat pipes, gravity-assist pipes for high temperature applications, solar applications, space applications, variable conductance heat pipes, European developments, and identification of areas requiring additional research. GRA

N75-14095# Council for Scientific and Industrial Research, Pretoria (South Africa). Chemical Engineering Research Group.
FORWARD INTEGRATION ALONG TUBESIDE STREAM FOR RATING MULTI-PASS COUNTERCURRENT CROSS-FLOW HEAT EXCHANGERS
W. Roetzel and M. Newman Jun. 1974 14 p ref
(PB-235700/2; CSIR-CENG-040; ISBN-0-7988-0519-6) Avail: NTIS HC $3.25 CSCL 07A

An iterative method is described for the incremental rating of a given air-cooled countercurrent cross-flow heat exchanger, with the inlet temperatures given and the outlet temperatures to be determined. The air outlet profile is estimated and the inlet profile calculated from it, until calculated and given air side inlet conditions agree closely. The developed method shows very good convergence. GRA

N75-13821 Kingston Polytechnic, Kingston-Upon-Thames (England).
A LITERATURE SURVEY ON JETS IN CROSSFLOW
E. C. P. Ransom and P. M. Wood *In* AGARD V/STOL Aerodyn. Oct. 1974 7 p refs (For availability see N75-13795 05-02)

N75-14637 Academy of Sciences (USSR), Moscow.
DETERMINING OPTIMAL TIME OF ACCUMULATION DURING REGISTRATION OF PARTICLE FLOW
V. F. Babkin *In its* Probl. of Cybernetics. Data Compression 1974 p 33-38 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N75-14096 British Broadcasting Corp., Kingswood (England). Research Dept.
A STEREO DIGITAL SOUND RECORDER
F. A. Bellis and M. K. E. Smith Nov. 1974 11 p refs
(BBC-RD-1974/39) Avail: BBC, Kingswood Warren, Tadworth Surrey, England

An experimental digital sound recorder was constructed as a means of studying, at a relatively slow data rate, the problems associated with digital magnetic recording and signal processing. Particular attention was paid to those aspects which would be encountered in a machine designed to record television signals in digital form. Due to its availability and convenience magnetic tape was chosen as the recording medium. Author

N75-14097*# Bendix Corp., Teterboro, N.J. Guidance Systems Div.
ADVANCED CONTROL MOMENT GYRO DEVELOPMENT Final Summary Report
J. M. Kolvek 1974 215 p
(Contract NAS8-25756)
(NASA-CR-120567) Avail: NTIS HC $7.25 CSCL 17G

The design and development are presented of a gimballed gyro and breadboard equipment. Test results and improvements are discussed. M.C.F.

N75-14098*# Technicolor Graphic Services, Inc., Houston, Tex.
EVALUATION OF S190A RADIOMETRIC EXPOSURE TEST DATA
Harold E. Lockwood and Robert A. Goodding Mar. 1974 216 p refs
(Contract NAS9-11500)
(NASA-CR-140387; TR-74-1) Avail: NTIS HC $7.25 CSCL 14E

The S190A preflight radiometric exposure test data generated as part of preflight and system test of KM-002 Sequence 29 on flight camera S/N 002 was analyzed. The analysis was to determine camera system transmission using available data which included: (1) films exposed to a calibrated light source subject; (2) filter transmission data; (3) calibrated light source data; (4) density vs. log10 exposure curves for the films; and (5) spectral sensitometric data for the films. The procedure used is outlined, and includes the data and a transmission matrix as a function of field position for nine measured points on each station-film-filter-aperture-shutter speed combination. Author

N75-14099*# Technicolor Graphic Services, Inc., Houston, Tex.
PROCESSING OF SL-4 ROLL 51, S190A UNFILTERED 2443 ORIGINAL
Harold E. Lockwood Jun. 1974 37 p
(Contract NAS9-11500; NASA Order-HT-105)
(NASA-CR-141451; TN-74-3) Avail: NTIS HC $3.25 CSCL 14E

The results of tests on processing the overexposed film on Skylab 4 are reported. The results of tests on type 2443 film exposed without a Wratten 12 filter are also included. F.O.S.

N75-14100*# Technicolor Graphic Services, Inc., Houston, Tex.
WATER PENETRATION STUDY
Harold E. Lockwood Nov. 1973 46 p
(Contract NAS9-11500)
(NASA-CR-141452; TN-73-11) Avail: NTIS HC $3.75 CSCL 14E

Nine film-filter combinations have been tested for effectiveness in recording water subsurface detail when exposed from an aerial platform over a typical water body. An experimental 2-layer positive color film, a 2-layer (minus blue layer) film, a normal 3-layer color film, a panchromatic black-and-white film, and an infrared film with selected filters were tested. Results have been tabulated to show the relative capability of each film-filter combination for: (1) image contrast in shallow water (0 to 5 feet); (2) image contrast at medium depth (5 to 10 feet); (3) image contrast in deep water (10 feet plus); (4) water penetration; maximum depth where detail was discriminated; (5) image color (the spectral range of the image); (6) vegetation visible above a water background; (7) specular reflections visible from the water surface; and (8) visual compatibility; ease of discriminating image detail. Recommendations for future recording over water bodies are included. Author

N75-14101# Joint Publications Research Service, Arlington, Va.
STOCHASTIC METHODS IN THE APPLIED THEORY OF GYROSCOPES
A. A. Sveshnikov and S. S. Rivkin 16 Dec. 1974 89 p refs Transl. into ENGLISH from the book "Veroyatnostnyye Metody V Prikladnoy Teorii Giroskopov" Moscow, 1974 p 472-536
(JPRS-63678) Avail: NTIS HC $4.75

The problem of determining the optimum characteristics of a dynamic system, a component part of which is a gyroscopic apparatus operating under the influence of random external perturbations is examined. Author

N75-14102# Aeronautical Research Labs., Melbourne (Australia).
AN ANALOGUE INTERFACE UNIT FOR A SEVEN-TRACK INCREMENTAL TAPE RECORDER
A. J. Farrell Apr. 1974 23 p
(ARL/Inst-Note-80) Avail: NTIS HC $3.25

An electronic unit is described which converts analog signals into digital form suitable for recording on a seven-track incremental tape recorder at rates up to 600 samples/sec. The operation of the unit is described, and circuits are provided. Author

N75-14103# California Univ., Livermore. Lawrence Livermore Lab.
ALGORITHMS FOR REDUCING YTTERBIUM STRESS-GAGE DATA
J. R. Hearst 22 May 1974 15 p refs
(Contract W-7405-eng-48)
(UCID-16491) Avail: NTIS HC $3.25

Computer-compatible algorithms for obtaining stress-time histories from the voltage-time histories of dual-conductor ytterbium gages were developed from the data of M. J. Ginsberg of the Stanford Research Institute. The technique is used to divide both the loading and unloading behavior of the ytterbium into several regions and to fit curves suggested by Ginsberg's work to each region. Author (NSA)

N75-14104# Kernforschungszentrum, Karlsruhe (West Germany).
EXPERIENCES WITH THE LIQUID METAL OXYGEN METER OF GULF UNITED NUCLEAR CORPORATION IN SODIUM CIRCUITS
H. U. Borgstedt, G. Drechsler, G. Frees, and G. Wittig May 1974 30 p refs In GERMAN; ENGLISH summary
(KFK-EXT-6/74-3) Avail: AEC Depository Libraries HC $4.50

The experience with emf-oxygen meters is mainly favorable in five years of operation of several commercial cells. The oxygen content of liquid sodium of experimental sodium rigs can be monitored continuously by the electrochemical method and concentration changes recorded quickly. The actual values of oxygen concentration can be read at the switchboard. The sensitivity of the ceramic electrolyte material THO2 with 15 w/% Y2O3 to thermal shocks and the necessity to calibrate each individual sensor are disadvantages. The individual sensors do not agree among themselves and with theoretical values. The use of emf cells does not eliminate the need for analytical oxygen measurements but can reduce the frequency of chemical analyses. Author (NSA)

N75-14105# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
VISUAL DISPLAY SYSTEMS FOR USE IN PROCESS CONTROL CONSOLES
K. Etschberger and R. Zimmermann Jan. 1974 47 p refs In GERMAN
(KFK-PDV-20) Avail: AEC Depository Libraries HC $5.50

Anthropotechnological aspects of visual display units for electronic devices and data visualization systems are elaborated. Considered are single displays of singular scalar units, integrated displays for numerous units, static picture displays, dynamic picture displays, and protocol units that contain stored information for later processing. Transl. by G.G.

N75-14106# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).

ANALYSIS OF REQUIREMENTS FOR VISUAL DISPLAYS AND ASSOCIATED CONTROLS

R. Zimmermann Apr. 1974 20 p In GERMAN; ENGLISH summary

(KFK-PDV-24) Avail: AEC Depository Libraries HC $4.00

A questionnaire is reported which can be used both for specification of user requirements concerning display and control capabilities and for analysis of characteristics of existing equipment. Author

N75-14107# Leybold-Heraeus G.m.b.H., Cologne (West Germany).

DEVELOPMENT AND DESIGN OF A He3/He4-DILUTION REFRIGERATOR [ENTWICKLUNG UND BAU EINES HE3/HE4-MISCH-KRYOSTATEN]

Manfred Wittig, Hans-Joachim Forth, Albert Hofmann, Juergen Kraus, and Peter Schaefer Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 42 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.

(BMFT-FB-T-74-18) Avail: NTIS HC $3.75; ZLDI, Munich 8,65 DM

Construction and operations of the cryostat are detailed, along with thermodynamic premises. Temperatures of 20 mK can be attained. Maximum refrigerating power is 1000 erg/s 0.1 mW at 100 mK. Prerefrigeration of H-3/H-4 mixture was performed by a Joule-Thomson step, H-3 being the working fluid. ESRO

N75-14108# Technisch Physisch Dienst TNO-TH, Delft (Netherlands). Afdeling Optiek.

HOLOGRAPHIC INVESTIGATION OF CAVITATION PHENOMENA IN A HIGH SPEED TUNNEL [HOLOGRAFISCH ONDERZOEK AAN CAVITATIEVERSCHIJNSELEN IN EEN HOGE SNELHEIDSTUNNEL]

H. J. Raterink, N. B. Oosterveld, and VanRenesse 16 Aug. 1974 16 p refs In DUTCH

(Contract A70/KM/154)

(TPD-1974-0-3; Rept-405.107; TDCK-65109) Avail: NTIS HC $3.25

Cavitation phenomena of a cylindrical body with a spherical nose were recorded holographically in a high speed water tunnel. Holograms were taken using a ruby pulsed laser. The results showed that bubbles with a diameter larger or equal to 5 microns practically do not occur upstream from the body. The holograms were also used to record the cavitation on the body. The effect of injecting polymers in the flow was studied. A solution of polymer Polyox WSR-31 was injected into the nose of the body. This polymer reduces the friction coefficient for flow around the body, if a turbulent boundary layer exists, and can suppress cavitation. ESRO

N75-14109# Universitaets-Sternwarte Goettingen (West Germany).

HOLOGRAPHIC ZONE PLATES AS IMAGING SYSTEMS FOR X-RAY ASTRONOMY [HOLOGRAPHISCHE ZONENPLATTEN ALS ABBILDENDE SYSTEME FUER DIE ROENTGEN-ASTRONOMIE]

Dietbert Rudolph Bonn Bundesmin. fuer Forsch. und Technol. Sep. 1974 77 p refs In GERMAN; ENGLISH summary Sponsored jointly by Bundesmin. fuer Forsch. und Technol. and Deut. Forschungsgemeinschaft

(BMFT-FB-W-74-07) Avail: NTIS HC $4.75; ZLDI, Munich 15,55 DM

A method for producing high power zone plates holographically by using laser light and photoresist layers is reported. These plates can be used as imaging systems in X-ray astronomy and X-ray microscopy. Zone plate combinations, aberrations, and particular methods to correct spherical aberration are discussed. Some types of manufactured zone plates and their possible applications are described. ESRO

N75-14110# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.

DEFINITION OF THE PARAMETERS RELATED TO THE GEOMETRIC TRANSFER FUNCTION IN THE ERC [DEFINITION DES PARAMETRES LIES A LA FONCTION DE TRANSFERT GEOMETRIQUE DE L'ERC]

A. Llebaria, ed. 8 May 1973 17 p In FRENCH

(LAS-73-ELC-071-D2B) Avail: NTIS HC $3.25

The parameters related to the geometric transfer function of the three channel photometer used in the field finder experiment are described. The elementary viewing zones of the image direction photocathode are defined together with their orthogonal sensitivity profiles at zone center. The geometric transfer function is then defined as a consequence of sweep tensions and electron beam deflection voltages. The mathematical parameters required are specified from which the linear overall transfer function is determined taking into account perturbing effects such as magnetism correction voltages, perpendicularity defect for deflexion axes, rotation shift of image dissector axes in respect to the experiment axes, and optical axis misalignment at objective in respect to the aligning mirror. The procedure for computation of the geometric parameters is discussed. ESRO

N75-14111# Institut Franco-Allemand de Recherches, St. Louis (France).

A SINGLE-COUNTER TECHNIQUE FOR DATA PROCESSING IN LASER ANEMOMETRY

H. J. Pfeifer and H. J. Schaefer 22 Aug. 1974 22 p refs

(ISL-30/74) Avail: NTIS HC $3.25

A new data processing technique for laser anemometry is described. Although this technique involves a reduced number of components and a shorter data processing period, the measurement accuracy attained equals that achieved with the well-known dual-counter method. Author (ESRO)

N75-14112# European Space Research Organization, Paris (France).

CALIBRATION OF THREE-COMPONENT STRAIN GAUGE BALANCES FOR MEASUREMENTS OF EXTREMELY LOW FORCES IN LOW DENSITY FLOWS

Edmund Weber Oct. 1974 29 p refs Transl. into ENGLISH of Eichung von Dreikomponenten-Dehnmessstreifen-Waagen zur Messung extrem geringer Krafte in Stromungen geringer Dichte, DLR-Mitt-73-33, DFVLR, 31 Oct. 1973

(ESRO-TT-96; DLR-Mitt-73-33) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 13,20 DM

The design of a balance especially built for measuring drag, lift, and pitching moments in wind tunnels of very low density is described. The measuring method was analyzed to evaluate its performance. Calibration was performed and demonstrated that the balance keeps to the standards set. Results show that interaction of components must be reduced; consequently, another layout was adopted for future development. Moment one was set back against the tapered end to obtain a greater distance between moments to increase accuracy. ESRO

N75-14113# Army Foreign Science and Technology Center, Charlottesville, Va.

AERIAL PHOTOGRAPHY EQUIPMENT, CHAPTERS 7-12

E. Arzhanov 15 Mar. 1974 149 p refs Transl. into ENGLISH from the book "Aerofotsyemochnoe Oborudovanie" Moscow, Nedra, 1972 p 94-183

(AD-786801; FSTC-HT-23-1305-73) Avail: NTIS CSCL 14/5

The two principal types of Russian aerial topographic cameras and some foreign aerial topographic cameras are described, as well as nontopographic slit, image shift compensation, panoramic and small-size aerial cameras. External orientations of aerial photos, methods of determining them and the apparatus used, gyrostabilizer units, statoscopes, radioaltimeters and radiogeodetic apparatus are described. Aerial magnetometry, gamma radiometry and other special survey apparatus is described briefly. Composition, installation, operation, maintenance, documentation and repair of aerial photography equipment is described, and a final section is devoted to the history of aerial photography. GRA

N75-14114# Naval Civil Engineering Lab., Port Hueneme, Calif.

HOLOGRAPHIC INTERFEROMETRY SURVEY FOR ENGINEERING MEASUREMENT APPLICATIONS Final Report,

Jul. 1972 - Jul. 1973
G. Warren Aug. 1974 61 p refs
(ZF61512001)
(AD-786346; CEL-TN-1350) Avail: NTIS CSCL 20/5

Several methods of holographic interferometry are presently available for engineering applications to problems concerning physical measurement. These methods include static and dynamic deformation analysis, holographic photoelasticity, and contouring. The techniques can be used to analyze structural components, to determine material properties, to detect material flaws, and to describe geometrically complex shapes. Example applications, beneficial characteristics, critical aspects, and equipment descriptions are presented and discussed. Author (GRA)

N75-14115# Army Foreign Science and Technology Center, Charlottesville, Va.
THE SENSITIVITY OF A RADIO-FREQUENCY THERMOGRAPHIC METHOD IN THE MILLIMETER-WAVE RANGE
M. N. Devyatkev and O. A. Kuleshov 29 Oct. 1973 5 p refs Transl. into ENGLISH from Vestn. Mosk. Univ., Ser. 3. Fiz. Astron. (Moscow), no. 5, 1970 p 576-577
(AD-785931; FSTC-HT-23-1211-73) Avail: NTIS CSCL 14/5

This study shows that a radio-frequency thermographic method which makes use of the relation of the kinetics of development of a latent image to the temperature can yield a relatively high sensitivity when using ordinary general-purpose photographic paper and film. By choosing the proper processing conditions and developer mixture, the thermal sensitivity can reach a magnitude at which the optical density of the sections of the emulsion differed by as much as 10-12%. GRA

N75-14521 Paris Univ., Orsay (France).
THE ORSAY MAGNETIC DETECTOR
Alain Quenzer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 125-133 refs (For availability see N75-14514 05-70)

36 LASERS AND MASERS

Includes parametric amplifiers.

N75-14116*# Laval Univ. (Quebec). Quantum Electronics Lab.
RUBIDIUM 87 GAS CELL STUDIES, PHASE 2 Report for 1 Aug. 1972 - 30 Jan. 1974
Jacques Vanier Feb. 1974 71 p refs
(Grant NGR-52-133-001)
(NASA-CR-141289) Avail: NTIS HC $4.25 CSCL 20E

The design, development, and characteristics of a rubidium 87 maser are discussed. The design of a receiver capable of locking a crystal oscillator to the maser signal is reported. The subjects considered are: (1) maser construction, (2) maser control electronics, (3) the characteristics of the receiver, and (4) results of experimental maser tests. Author

N75-14117# United Kingdom Atomic Energy Authority, Culham (England). Culham Lab.
SURFACE TREATMENTS BY LASER
J. W. Hill, M. J. Lee, and I. J. Spalding Jan. 1974 10 p
Avail: AEC Depository Libraries HC $4.00

Surface treatments practicable with multi-kilowatt, continuous laser beams are considered. In particular, the mechanism, parameters and advantages for surface hardening of steels are outlined and test results described. The use of lasers for de-scaling and the bonding of powders to metallic surfaces is also proposed. NSA

N75-14118# Technische Hochschule, Aachen (West Germany). Inst. fuer Luft- und Raumfahrt.
APPLICATION OF AN INTERFERENCE FREE METHOD FOR THE MEASUREMENT OF VELOCITIES IN SUPERSONIC FLOWS
Kenneth K. Roberge 1974 106 p refs Sponsored by Min. fuer Wiss. und Forsch. des Landes Nordrhein-Westfalen
(DLR-FB-74-38) Avail: NTIS HC $5.25; DFVLR, Porz, West Ger. 39,20 DM

This method is based on focusing a high power laser beam to a point in the flow which becomes ionized and forms a visible spark. This spark moves with the free stream and is traced by one or more image converter cameras. The method provides a practical solution to the instrumentation problem but is rather costly. Accuracies obtained are about 4% against about 2% for conventional instrumentation. ESRO

N75-14119# JENAER Glaswerk Schott and Gen., Mainz (West Germany).
DEVELOPMENT OF GLASS CERAMIC AS ACTIVE LASER MATERIAL [ENTWICKLUNG VON GLASKERAMIK ZUR VERWENDUNG ALS AKTIVES LASERMATERIAL]
Gerd Mueller and Norbert Neuroth Bonn Bundesmin. fuer Forsch. und Technol. Jun. 1974 13 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-16) Avail: NTIS HC $3.25; ZLDI, Munich 2,75 DM

Fluorescence and laser properties of glass ceramics were optimized by systematic variation of composition and crystallization conditions. The rare earth oxide and nucleating agent contents are of predominant importance. A special melting technique for obtaining the glass quality necessary for laser applications was developed. The laser efficiency of the glass ceramics is inferior to that of modern laser glasses, but the resistance against pumping energy is superior. ESRO

N75-14120# AEG-Telefunken, Frankfurt am Main (West Germany).
GROWTH AND INVESTIGATION OF NIOBATE SINGLE CRYSTALS FOR THE MODULATION OF LASER LIGHT [HERSTELLUNG UND UNTERSUCHUNG VON NIOBAT-EINKRISTALLEN ZUR MODULATION VON LASER-LICHT]
Harald Matthes Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 120 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-17) Avail: NTIS HC $5.25; ZLDI, Munich 25,20 DM

Single crystals of Ba2LiNb5015 were grown by the Czochralsky technique for use in frequency doubling of YAG laser light in an optical data storage system. Transmission, phase matching data, nonlinear optical coefficient, and resistivity to optical damage were measured on appropriate samples. The system BaO-Li20 Nb205 was studied by means of differential thermal analysis and unknown subsystems were detected. ESRO

N75-14121# Technisch Physisch Dienst TNO-TH, Delft (Netherlands). Afdeling Optiek.
INVESTIGATION AND DEVELOPMENT OF LASER DOPPLER VELOCIMETER FOR MEASUREMENT OF VELOCITY PROFILES IN A WAKE, PART 1 [ONDERZOEK EN ONTWIKKELING LASER DOPPLER SNELHEIDSMETER VOOR HET METEN VAN SNELHEIDSPROFIE LEN IN EEN VOLGSTROOM DEEL I]
H. J. Raterink and A. H. VanKrieken 29 Aug. 1974 52 p In DUTCH and partly in ENGLISH
(Contract A70/KM/155)
(TPD-1974-0-4; Rept-405.108; TDCK-65221) Avail: NTIS HC $4.25

The applicability of the laser Doppler anemometer for velocity measurements in the wake of ship models was examined. The mechanical construction, several optical configurations for the measurement system, signal processing and recording, and data processing are discussed. The laser anemometer can be used for qualitative and quantitative investigation of the flow field around a model ship. Performance and results of experimental wake measurements are described. ESRO

N75-14122# Institut Franco-Allemand de Recherches, St. Louis (France).
INFRARED EMISSION CALCULATION AT 4.26 MICROMETERS FROM CO2 LASER MEDIA [CALCUL DE L'EMISSION INFRAROUGE A 4,26 MICROMETRES DE MILIEUX LASER CO2]
S. Bihl, J. P. Fouassier, and R. Joeckle 12 Nov. 1973 24 p refs In FRENCH; ENGLISH summary Submitted for publication

(ISL-PU-3/73) Avail: NTIS HC $3.25

Vibrationally excited CO2 present with inverted population emits infrared radiation at 4.26 microns. For an emitter consisting of optically-thick isolated lines, calculations allow determination of the emissivity and radiancy of a homogeneous layer of gas. Infrared emission is a useful tool for measurement of the energy contained in the upper laser level. A very thin layer of cold gas strongly alters the spectral distribution of the intensity and causes the total radiancy to decrease. ESRO

N75-14123# Institut Franco-Allemand de Recherches, St. Louis (France).

APPLICATION OF LASER DIFFERENTIAL INTERFEROMETERS TO GAS DYNAMICS [ANWENDUNGEN DES LASER-DIFFERENTIALINTERFEROMETERS IN DER GASDYNAMIK]

G. Smeets and A. George 7 Nov. 1973 74 p refs In GERMAN

(ISL-28/73) Avail: NTIS HC $4.25

Optical equipment for the application of laser differential interferometers to various gas dynamic problems are systematically surveyed and the possibilities of the method shown for various examples. The sensitivity of the interferometer is exemplified for the recording of a sound wave. Spatial resolution obtained by focusing is demonstrated for a shock wave profile. Multiple beam arrangements are described and illustrated. Profile measurements with a deviating mirror are described. Applications to stray and luminescent phase objects are covered. ESRO

N75-14124# Ballistic Research Labs., Aberdeen Proving Ground, Md.

INITIATION AND PROPAGATION OF LASER SUPPORTED COMBUSTION WAVES

Frank J. Allen, William F. Braerman, and Charles R. Stumpfel 1974 16 p refs

(AD-785602) Avail: NTIS CSCL 20/5

This paper concerns laser supported combustion waves, which occur at rather low incident intensities, and describes their ignition and propagation at sea level atmospheric pressure. GRA

N75-14125# Army Electronics Command, Fort Monmouth, N.J.

THE 20 PPS HOLMIUM: YTTRIUM LITHIUM FLUORIDE LASER TRANSMITTER

1974 16 p refs

(AD-785669) Avail: NTIS CSCL 20/5

Holmium-doped yttrium lithium fluoride (Ho:YLF), emitting at 2.06 micrometers, is a promising material for laser target designators. In the following sections, the design and construction of a 20 pps 2 micrometer designator transmitter is presented. In the following, the systems specifications of the 1.06 micrometer lightweight designator, presently undergoing engineering development, are accepted as the relevant baseline for a 2 micrometer device. The salient features of the 1.06 micrometer device are: 100 mJ output, 20 ns pulse length, 10-20 pps, 0.2 mrad beam divergence, and 12 lb total weight. GRA

N75-14126# ILC Technology, Inc., Sunnyvale, Calif.

OPTICAL PUMPS FOR HOLMIUM LASERS Final Report, 1 Jul. 1972 - 30 Jun. 1973

Lowell Noble, Leonard Redd, Robert Maynard, and Harry Flentz Jul. 1974 80 p refs

(Contract DAAB07-72-C-0274; DA Proj. 1S7-62703-A-186) (AD-786675; R-ILC-73-7/F; ECOM-72-0274-F) Avail: NTIS CSCL 20/5

The objective of this program was to increase the efficiency of optical pumps for low energy holmium lasers. The characteristics of the final lamps, modulator circuitry and cavity are given. Also are recommendations for future lamps, cavity and modulator, based upon data taken during this program. Efficiency improvements were achieved by optimizing the bore diameter, fill pressure, gas composition, envelope wall material, pulse length and starting method. Active filters, Ho:YLF materials of differing composition, and various cavity configurations were also investigated. GRA

N75-14127# Massachusetts Inst. of Tech., Cambridge. Dept. of Physics.

EXPLORATION OF GAS LASER APPLICATION IN THE INFRARED AND VISIBLE RANGE Final Report, 1 Sep. 1971 - 30 Apr. 1974

Ali Javan 10 Jun. 1974 21 p refs

(Contract F19628-72-C-0049; AF Proj. 5634)

(AD-786416; AFCRL-TR-74-0073) Avail: NTIS CSCL 20/5

This report summarizes research in the areas of relaxation and energy processes, short pulse generation and propagation, frequency mixing and fast-response optical diodes, and spectroscopic studies. A bibliography of published papers on the related subjects is included. Author

N75-14128# Oregon Graduate Center for Study and Research, Beaverton. Dept. of Applied Physics and Electronic Science.

EXPERIMENTAL PULSED LASER, REMOTE CROSSWIND MEASUREMENT SYSTEM: FEASIBILITY STUDY AND DESIGN Final Report, 7 Dec. 1973 - 30 Jun. 1974

J. Fred Holmes and J. Richard Kerr Jul. 1974 47 p refs

(Contract DAAD07-74-C-0094)

(AD-786647; ECOM-740094-1) Avail: NTIS CSCL 20/5

The feasibility determination and design for an experimental, pulsed laser, diffuse target, remote crosswind measurement system is described. The system consists of a laser transmitter, a diffuse target and a receiver A unique scheme using a double-pulsed, Q-switched ruby laser is used to measure the slope of the time delayed autocovariance function at zero time delay which under appropriate conditions is proportional to the weighted average crosswind along the laser propagation path. The receiver consists of two silicon vidicons, a spinning disk for directing alternate pulses to the vidicons and appropriate scanning circuitry for generating a 10 x 10 array of apertures on each vidicon. (Modified author abstract) GRA

N75-14538 Massachusetts Inst. of Tech., Cambridge. Francis Bitter National Magnet Lab.

THE SPIN-FLIP RAMAN LASER

M. H. Weiler, R. L. Aggarwal, and B. Lax *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 221-239 refs (For availability see N75-14531 05-70)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N75-14129 Polish Academy of Sciences, Warsaw.

ANALYSIS OF REASONS FOR SEIZING CYLINDER LINERS AND PISTON RINGS OF COMBUSTION ENGINES [BADANIA PRZYCZYN ZACIERANIA SIE TULEI CYLINDROWYCH I PIERSCIENI TLOKOWYCH SILNIKOW SPALINOWYCH]

Edward Romanowski 1974 252 p refs In POLISH

(Rept-27/1974) Avail: Issuing Activity

The identification of cylinder liner and piston ring defects, reasons for their formation, and measures for preventing them are discussed. Construction, strengths, and weaknesses were investigated, along with material requirements, temperature distribution, and combustion engine construction.

Transl. by M.J.S.

N75-14130 Polish Academy of Sciences, Warsaw.

DIAGNOSTIC INVESTIGATIONS OF MECHANICAL DEVICES [BADANIA DIAGNOSTYCZNE URZADZEN MECHANICZNYCH]

Waldemar Kurowski, J. Dekert, and B. Rysinski 1974 20 p refs In POLISH

(Rept-20/1974) Avail: Issuing Activity

Systematization and generalization of known investigative methods in a systematic approach to the analysis of mechanical devices were investigated. The effects of friction wear, and dynamic acoustic and thermal processes on mechanical devices are discussed. Transl. by M.J.S.

N75-14131*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

A REMOTELY OPERABLE ARTICULATED MANIPULATOR Patent Application

Ray E. Marlow, inventor (to NASA) (Sperry Rand Corp.) Filed

23 Dec. 1974 23 p Sponsored by NASA
(NASA-Case-MFS-22707-1; US-Patent-Appl-SN-535410) Avail: NTIS HC $3.25 CSCL 13I

The manipulator includes a plurality of serially connected drive shafts, having a grasping device mounted at the distal end of the ultimate drive shaft of the plurality. A plurality of joints is also included with meshed pairs of beveled gears 61 and 70 interconnecting the drive shafts. A plurality of drive tubes are concentrically related to the drive shafts and interconnected through meshed level gears for imparting angular displacement. NASA

N75-14132*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
A DEVICE RESPONSIVE TO APPLIED TORQUE FOR GRASPING AN ELONGATED, EXTERNALLY THREADED BODY AS THE BODY IS EXTRACTED FROM AN INTERNALLY THREADED OPENING Patent Application
Kenneth Daniels (Martin Marietta Corp.), Leo Rothermel (Martin Marietta Corp.), and Dennis E. Herrick, inventors (to NASA) (Martin Marietta Corp.) Filed 11 Dec. 1974 13 p Sponsored by NASA
(NASA-Case-MFS-22957-1; US-Patent-Appl-SN-531648) Avail: NTIS HC $3.25 CSCL 13I

The device is characterized by a collet having a tubular body terminating in an annular array of flexible fingers having an internal surface defining an annulus for concentrically receiving the body. An external surface of a frusto-conical configuration and an elongated sleeve are described. NASA

N75-14133# Technische Universitaet, Hanover (West Germany).
THEORETICAL, PHYSICOCHEMICAL AND EXPERIMENTAL STUDIES ON THE APPLICATION OF A ROTATING LIGHT ARC TO WIRE MATERIALS Ph.D. Thesis [THEORETISCHE, PHYSIKALISCH-CHEMISCHE UND EXPERIMENTELLE UNTERSUCHUNGEN ZUR ANWENDBARKEIT EINES ROTIERENDEN LICHTBOGENS FUER DRAHTWERKSTOFF]
Konstantinos Kelaiditis 1974 245 p refs In GERMAN
Avail: NTIS HC $7.50

A concentric electrode arrangement and an external magnetic field are used to produce rotating plasma arc jets for manufacturing wire- and tube-shaped metal pieces without dissolving the surface. Transl. by G.G.

N75-14134*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ANALYTICAL DESCRIPTION OF THE MODERN STEAM AUTOMOBILE
Jerry A. Peoples Nov. 1974 135 p refs
(NASA-TM-X-72199; M-TU-74-7) Avail: NTIS HC $5.75 CSCL 13F

The sensitivity of operating conditions upon performance of the modern steam automobile is discussed. The word modern has been used in the title to indicate that emphasis is upon miles per gallon rather than theoretical thermal efficiency. This has been accomplished by combining classical power analysis with the ideal Pressure-Volume diagram. Several parameters are derived which characterize performance capability of the modern steam car. The report illustrates that performance is dictated by the characteristics of the working medium, and the supply temperature. Performance is nearly independent of pressures above 800 psia. Analysis techniques were developed specifically for reciprocating steam engines suitable for automotive application. Specific performance charts have been constructed on the basis of water as a working medium. The conclusions and data interpretation are therefore limited within this scope. Author

N75-14135*# Kentron Hawaii Ltd., Houston, Tex.
PROCEDURE FOR PREPARATION FOR SHIPMENT OF NATURAL GAS STORAGE VESSEL
A. M. Amawd Oct. 1974 15 p ref
(Contract NAS9-13413)
(NASA-CR-141455; JSC-09233) Avail: NTIS HC $3.25 CSCL 13L

A method for preparing a natural gas storage vessel for shipment is presented. The gas is stored at 3,000 pounds per square inch. The safety precautions to be observed are emphasized. The equipment and process for purging the tank and sampling the exit gas flow are described. A diagram of the pressure vessel and the equipment is provided. Author

N75-14136*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF SPEED AND LOAD ON ULTRA-HIGH-SPEED BALL BEARINGS
Eric N. Bamberger (General Electric Co., Cincinnati), Erwin V. Zaretsky, and Hans Signer (Industrial Tectonics, Inc., Compton, Calif.) Washington Jan. 1975 27 p refs
(NASA-TN-D-7870; E-8074) Avail: NTIS HC $3.75 CSCL 13I

A study was undertaken to determine the effects of speed and load on the operation of 120-mm bore angular-contact ball bearings at speeds to 25,000 rpm and thrust loads to 22,240 newtons (5000 lb). Bearing temperature and power consumption increased with increases in load and/or speed. The effect of load on temperature and power consumption was small relative to the speed effect. Actual measurements of bearing operating contact angle were in excellent agreement with theoretical predictions. Skidding occurred in the bearing in various amounts, generally increasing with speed at given load. The highest amount of skidding, 6 percent, occurred at the highest speed, 25,000 rpm. No visible damage to the bearing surfaces occurred due to the skidding. Author

N75-14137# Zeiss (Carl), Oberkochen (West Germany).
DEVELOPMENT OF AUTOMATICALLY CONTROLLED MACHINING PROCESSES FOR OPTICAL WORKPIECES BY RADIATION ENERGY [ENTWICKLUNG VON AUTOMATISCH GESTEUERTEN BEARBEITUNGSVERFAHREN OPTISCHER WERKSTUECKE DURCH STRAHLUNGSENERGIE]
Bonn Bundesmin. fuer Forsch. und Technol. Oct. 1974 85 p refs In GERMAN; ENGLISH summary Prepared jointly with Jenaer Glaswerke Schott & Gen. Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-24) Avail: NTIS HC $4.75; ZLDI, Munich 17.85 DM

Ion beam machining, electron beam welding, ion sputtering, and ion beam erosion were investigated as possible candidates for automatic machining of glass. The interaction of an ion beam with a glass surface was investigated to determine the most effective ion beam conditions for machining purposes. A special pulse technique for electron beam welding of glass was demonstrated. Ion sputtering techniques for depositing metal layers on glass substrates were examined and led to the use of a multiple beam target. Accurate methods for electronic control of an ion beam erosion process on glass were investigated, based on processing of laser interferograms. For individual titles, see N75-14138 through N75-14141.

N75-14138 JENAER Glaswerk Schott and Gen., Mainz (West Germany).
INTERACTIONS OF ENERGETIC ION BEAMS WITH GLASS SURFACES [WECHSELWIRKUNG ENERGIEREICHER IONENSTRAHLEN MIT GLASOBERFLAECHEN]
Hans Bach *In* Zeiss (Carl) Develop. of Autom. Controlled Machining Process. for Opt. Workpieces by Radiation Energy Oct. 1974 p 9-37 In GERMAN; ENGLISH summary (For availability see N75-14137 05-37)

The interaction of an ion beam with a glass surface was investigated with a view to determining the most effective conditions (ion energy, angle of ion incidence, doses efficiency) for the application of ion beam machining techniques. Sputtering rates and sputtering yields for different ion energies up to 50 keV were measured, and specific energy losses were estimated from damage depths at silica surfaces. It is shown experimentally that basic assumptions of sputtering theories also apply to glasses. ESRO

N75-14139 Zeiss (Carl), Oberkochen (West Germany).
ELECTRON BEAM WELDING OF GLASS [ELEKTRONENSTRAHL-SCHWEISSEN VON GLAS]
Fritz Schleich *In its* Develop. of Autom. Controlled Machining Process. for Opt. Workpieces by Radiation Energy Oct. 1974 p 38-44 In GERMAN (For availability see N75-14137 05-37)

The possibility of using electron beams for welding optical glasses was investigated. Results show that by using a special pulse technique optical glass 2 to 3 mm thick can be welded. The pulse shape used allows regulating the cooling process after each pulse and preheating in vacuum using an electron beam vacuum oven. ESRO

N75-14140 Zeiss (Carl), Oberkochen (West Germany).
ION SPUTTERING FOR MANUFACTURING THIN LAYERS [IONENZERSTAEUBUNG FUER DIE HERSTELLUNG DUENNER SCHICHTEN]
Dietrich Hoffmeister and Fritz Schleich *In its* Develop. of Autom. Controlled Machining Process. for Opt. Workpieces by Radiation Energy Oct. 1974 p 45-69 In GERMAN (For availability see N75-14137 05-37)

The effectiveness of electric and magnetic fields in an argon plasma at 5 KV was investigated in regard to ion sputtering. Copper, used as a model target material, was sputtered onto a glass substrate with a diameter of 70 to 100 mm. The film thickness was determined from optical transmission measurements. Experiments were carried out using direct current operation. Results indicate the use of a multiple zone target for relatively low pressure operation which provides a layer thickness variation of better than +1 or -1%. ESRO

N75-14141 Zeiss (Carl), Oberkochen (West Germany).
ELECTRONIC CONTROL FOR THE AUTOMATICALLY CONTROLLED EROSION PROCESS. FAST EVALUATION OF INTERFEROGRAMS [ELEKTRONISCHE STEUERUNG FUER DEN AUTOMATISCH GESTEUERTEN ABTAGSPROZESS. SCHNELLAUSWERTUNG VON INTERFEROGRAMMEN]
Ulrich Eckstein *In its* Develop. of Autom. Controlled Machining Process. for Opt. Workpieces by Radiation Energy Oct. 1974 p 70-85 refs In GERMAN (For availability see N75-14137 05-37)

Accurate methods for control of ion beam erosion processes were investigated, based on noncontacting measurement of the surface. The method consists of laser interferography, electronic processing, and evaluation of the interferograms. Results in the form of pulses can be used for erosion machine control. The diapositive of a laser interferogram is scanned by a flying spot, and the optical signal, detected by a photoelement, can be used for further processing. ESRO

N75-14142# Bendix Corp., Kansas City, Mo.
ULTRASONIC WELDING OF ELECTRICAL TERMINATIONS
G. S. Darner Aug. 1974 10 p refs
(Contract AT(29-1)-613)
(BDX-613-1158-Rev) Avail: NTIS HC $3.25

Smooth weld tip and anvil surfaces are discussed along with electrical discharge machining surface finishes damage weld materials. Copper-to-aluminum samples showed no weld degradation following environmental tests. It is shown that materials must be of similar hardness to achieve high quality welds, and soft materials are sensitive to machine parameter changes. NSA

N75-14143# Mound Lab., Miamisburg, Ohio.
GRINDING MACHINE FOR SHARPENING CONTOUR CUTTERS USED TO SHAPE AND SLOT ELECTRODES
C. F. Draut, E. J. McCloskey, and J. E. Weeks 24 Jun. 1974 14 p refs
(Contract AT-33-1-GEN-53)
(MLM-2124) Avail: NTIS HC $3.25

A special grinding machine, designed and built to provide capability for accurately and repeatedly positioning and sharpening single cutting surface tools used in shaping and slotting the tops of extended electrode wires in detonator heads, is introduced. The machine incorporates a fixture mounted on a polar rotor with angular calibrations. Grinding or sharpening of a cutting tool is accomplished by mounting the tool in the fixture and then feeding the fixture into the grinding wheel as the grinding wheel is automatically raised and lowered via a cam. Feeding of the fixture into the cutter is controllable in two horizontal axes by the use of slides equipped with micrometers of 0.001 in. resolution. A motor controller is used to vary or regulate the speed at which the grinding wheel head is raised and lowered. This special grinding machine has a distinct advantage over currently used methods: (1) its compact design permits use and location in same area in which shaping and slotting tool is used thus eliminating transportation of machine, and (2) its compactness eliminates setup time. Author

N75-14144# Mound Lab., Miamisburg, Ohio.
ELASTIC RING COMPRESSION CRIMPING ASSEMBLY PROCESS FOR THE MC1957A PROGRAM
T. K. Ferguson 21 Jun. 1974 28 p
(Contract AT-33-1-GEN-53)
(MLM-2114) Avail: NTIS HC $3.75

A force-controlled, process monitored, crimping system was designed and built to attach a thin wall, aluminum cup to the MC1957A detonator assembly. A process development study was conducted to determine the most reliable crimping method, and prototype testing was performed to verify the proposed design criteria. The resulting system is a pneumatic-driven elastic ring crimper, is suitable for use in an explosive area, and features built-in operator safety controls. The electrical control cabinet contains both the crimp force monitoring system and data printout system. The cabinet is sealed and purged with positive air pressure, which must exceed a preset pressure level to actuate an incoming electrical power fail-safe switch. Author (NSA)

N75-14145# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Munich (West Germany). Inst. fuer Flugtreib- und Schmierstoffe.
POTENTIALS TO PREDICT LIFE OF MoS2 LUBRICATING LAYERS IN ANTIFRICTION BEARINGS IN ULTRAHIGH VACUUM ENVIRONMENT [MOEGLICHKEIT ZUR VORAUS BERECHNUNG DER LEBENSDAUER VON MoS2-SCHMIERSCHICHTEN IN WAELZLAGERN BEI ULTRAHOCHVAKUUM-BEDINGUNGEN]
Willy Hellwig 29 Apr. 1974 40 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-33) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 17,60 DM

Plain bright bearing races are coated with MoS2 to provide antifriction bearings with dry lubricating layers in ultrahigh vacuum. The life of these layers is measured with sheet metal retainers and lubricative compound retainers. Results indicate that the lifetime of such layers is dependent on the number of ball load cycles and that lifetime and ball load are exponential to each other. Simple correlations are prevailing between torque, number of balls, ball load, and retainer material. By extrapolations from measurements at higher loads, approximate predictions can be made on the potential lifetime of layers at lower loads provided ball retainers are similar. Potential applications of MoS2 dry lubricated antifriction bearings in ultrahigh vacuum are presented. Author (ESRO)

N75-14146# National Centre of Tribology, Risley (England). European Space Tribology Lab.
OPTICAL AND ELECTRON MICROSCOPY OF LEAD-FILMED BALL-BEARINGS AFTER LONG USAGE IN HIGH VACUUM
A. A. McFarlane and M. J. Todd [1973] 34 p refs Sponsored by ESRO
(ESRO-ESTL-4; ESRO-CR(P)-508) Avail: NTIS HC $3.75

Lead-lubricated angular-contact bearings which had run successfully for long periods in high vacuum were examined using optical microscopy with energy dispersive X-ray analysis and electron probe microanalysis. The cageless tool steel bearings had produced wear debris selectively enriched with the discontinuous high tungsten phase from the tool steel. The balls in the tool steel with lead bronze cage bearing and the EN31 (52100) steel with lead bronze cage bearing had acquired a thin uniform bronze coating with virtually no steel debris. ESRO

N75-14147# National Centre of Tribology, Risley (England). European Space Tribology Lab.
SOME OBSERVATIONS ON LEAD FILMS FOR VACUUM LUBRICATION
M. J. Todd Jun. 1974 40 p refs Prepared jointly with Salford Univ. Sponsored by ESRO
(ESRO-ESTL-6; ESRO-CR(P)-510) Avail: NTIS HC $3.75

The sliding friction and wear coefficients between a clean

steel ball and a flat disc covered with a thin lead film were obtained under vacuum. The steel wear rate was some three orders of magnitude lower than with an uncoated disc, but no significant difference in wear or in friction was found between the two lead depositions that were used, viz vacuum evaporation and ion sputtering. Optical and electron microscopy show the greater film uniformity obtainable with ion sputtering and a stripping test demonstrated the improved film-substrate adhesion with the sputtering method. ESRO

N75-14148# National Centre of Tribology, Risley (England). European Space Tribology Lab.
REPORT OF DISMANTLING AND EXAMINATION OF NO. 1 HAWKER SIDDELEY DYNAMICS LOW SPEED MECHANISM
J. A. Duvall Jun. 1974 28 p Sponsored by ESRO
(ESRO-ESTL-7; ESRO-CR(P)-511) Avail: NTIS HC $3.75

The performance of the No.1 Hawker Siddeley dynamics low speed mechanism was checked by investigating the condition of the various components after the satisfactory accelerated life test. ESRO

N75-14149# Laboratoire Suisse de Recherches Horlogeres, Neuchatel (Switzerland).
LUBRICATION OF BALL BEARINGS UNDER VACUUM Interim Report [LUBRIFICATION SOUS VIDE DE ROULEMENTS A BILLES]
H. Gass, H. E. Hintermann, and H. R. Kocher Paris ESRO Jan. 1974 45 p In FRENCH
(Contract ESTEC-1495/71-HP)
(ESRO-CR-163) Avail: NTIS HC $3.75

The choice of materials for small high vacuum and high speed ball bearings without lubrication in service is discussed. Tests for improving the titanium carbide deposition process in such a way that the bearing races suffer minimum deformation are described. The technique of developing silver/indium alloys with improved homogeneity is dealt with and the transfer of material in ball bearings with silver/indium casings is discussed. ESRO

N75-14150# National Centre of Tribology, Risley (England). European Space Tribology Lab.
COMPARATIVE TESTS ON ROD-END BEARINGS FOR APPLICATIONS IN VACUUM
K. T. Stevens Jun. 1974 34 p Sponsored by ESRO
(ESRO-ESTL-8; ESRO-CR(P)-543) Avail: NTIS HC $3.75

Friction and wear properties of various self-lubricating rod-end bearings in air and ultrahigh vacuum were evaluated. Results indicate that differences in bearing preload during manufacture produce variations in friction force and breakout torque. Some bearings also exhibit great variations in friction torque during any complete revolution. The friction coefficient in vacuum was similar for all bearing types, but one type suffered considerable wear. ESRO

N75-14151# Laboratoire Suisse de Recherches Horlogeres, Neuchatel (Switzerland).
VACUUM LUBRICATION OF BALL BEARINGS Final Report [LUBRIFICATION SOUS VIDE DE ROULEMENTS A BILLES RAPPORT FINAL]
H. Gass, H. E. Hintermann, and H. R. Kocher 6 Jun. 1974 16 p In FRENCH
(Contract ESTEC-1495/71-HP)
(ESRO-CR(P)-540; Rept-781-9.3) Avail: NTIS HC $3.25

Small ball bearings dimensioned for high vacuum, high velocity operation without lubrication were tested. Titanium carbide coated steel rings matched with titanium 60-indium 40 alloy ball races and chromium steel balls showed marked deterioration of the titanium carbide coating, probably due to accumulation on the rings of nonductile material transferred from the race by the balls. Rings coated with a chromium-chromium carbide-titanium carbide composite coating showed better performance. It was concluded that deposition of a homogenous thin layer of ductile material on the races would be advisable. ESRO

N75-14152# Hollandse Signaalapparaten N. V., Hengelo (Netherlands).
FURTHER TESTING AND DESIGN IMPROVEMENT OF GREASE LUBRICATED SPIRAL GROOVE BEARING MOMENTUM WHEEL Final Report
J. A. C. Bollen, comp. [1974] 329 p refs
(Contract ESTEC-1798/72-AA)
(ESRO-CR(P)-544) Avail: NTIS HC $9.50

An improved bearing seal component with optimal grease retention in vacuum environment was designed and tested for a momentum wheel used in satellite stabilization. A helical groove viscous seal with a very narrow gap and a long sealing path was developed. The bearing was replaced by an optimal stiffness radial type. Configurations allowing full or partial circulation of the grease thus permitting automatic separation of gas from the grease in the region of the seal were investigated. Current status of design of the 25 Nms flywheel is included. ESRO

N75-14153# Army Materials and Mechanics Research Center, Watertown, Mass.
PROCEEDINGS OF THE ARMY SYMPOSIUM ON SOLID MECHANICS, 1974: THE ROLE OF MECHANICS IN DESIGN STRUCTURAL JOINTS Final Report
Sep. 1974 346 p refs Presented at the 1974 Army Symp. on Solid Mech., Bass River, Mass., 10-12 Sep. 1974
(AD-786543; AMMRC-MS-74-8) Avail: NTIS CSCL 13/5

The 1974 symposium was held at Bass River (Cape Cod), Massachusetts, on the theme The Role of Mechanics in Design - Structural Joints. Papers were presented under the following headings: Bonded joints; Work in progress; Fasteners; and; Design applications. GRA

N75-14154# Aerospace Corp., El Segundo, Calif.
AN EXPERIMENTAL INVESTIGATION OF TORQUE NOISE IN SATELLITE BEARINGS Final Report, Mar. 1971 - May 1974
H. Greer and R. A. Mack 1 Jul. 1974 31 p refs
(Contract F04701-74-C-0075)
(AD-786782; TR-0074(5901-03)-3; SAMSO-TR-74-215) Avail: NTIS CSCL 13/9

Many spin-stabilized spacecraft use precision ball bearings to support and to align an antenna or instrument platform relative to the rotor. The pointing accuracy of the instrument platform is affected by the dynamic fluctuations in running torque or torque noise of the bearings. Although many previous investigations have been concerned with average (or dc) torque, there is a lack of information on the spectral distribution of the torque noise of lightly loaded, large-diameter bearings at slow speeds. This paper summarizes experiments performed on seven pairs of bearings of two bore sizes. Limited measurements of bearing profilometry were made. A special fixture was used to measure torque noise over a range of preload, rotational speed, and temperature. (Modified author abstract) GRA

N75-14155# Boeing Vertol Co., Philadelphia, Pa.
TEST RESULTS REPORT AND DESIGN TECHNOLOGY DEVELOPMENT REPORT. HLH/ATC HIGH-SPEED TAPERED ROLLER BEARING DEVELOPMENT PROGRAM Final Report
Joseph W. Lenski, Jr. Jun. 1974 173 p refs
(Contract DAAJ01-71-C-0840; DA Proj. 1X2-63203-D-156)
(AD-786561; T301-10248-1; USAAMRDL-TR-74-33) Avail: NTIS CSCL 13/9

The high-speed and load capability of tapered roller bearings has been demonstrated by several research and development programs conducted jointly by the Boeing Vertol Company and the Timken Company. Tests were conducted on a 3.5-inch bore (6500 series) tapered roller bearing operating at 16,000 rpm (20,000 fpm) and supporting a thrust load of 5500 pounds and a radial load of 7500 pounds. Although the tests were successful and demonstrated the high-speed capability of tapered roller bearings, additional experimental testing appeared necessary to evaluate the tapered roller bearings selected for the HLM/ATC drive system. (Modified author abstract) GRA

N75-14156# Lehigh Univ., Bethlehem, Pa.
AN IMPROVED UPPER-BOUND ANALYSIS OF THE UPSET FORGING TO STRIP AND ITS APPLICATION TO THE CYLINDRICAL DISC GEOMETRY Interim Report
Ronald A. Kohser Jun. 1974 57 p refs
(Grant NSF GK-37536)

(PB-236158/2) Avail: NTIS HC $4.25 CSCL 13H

For a Mises material with the assumption of constant shear stress friction prevailing between the forge platens and deforming solid, a two-zone velocity field was solved by upper-bound limit analysis for the rectangular strip and cylindrical disc geometries. This velocity field resulted in a lower upper-bound (i.e. improved solution) for the strip geometry for conditions of high friction and a wide range of strip geometries. When applied to the disc geometry, however, the technique failed to produce an improved solution. Details of the analyses are provided along with results showing the domain of the improved solution for rectangular strip. Reasons for the 'failure' of the disc analysis are discussed. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N75-14157# Sandia Labs., Albuquerque, N.Mex.
ASSURANCE OF STOCKPILE QUALITY THROUGH STOP-RULE SAMPLING
J. R. Ellefson Jul. 1974 13 p refs
(Contract AT(29-1)-789)
(SAND-74-0029) Avail: NTIS HC $3.25

Procedures for identifying the appropriate level of assurance offered by current sampling techniques are considered. Mathematical models, testing and continuing, testing and stopping, long-term equilibrium, and stockpile quality parameters are discussed. F.O.S.

N75-14158# Grimes (W.J.) and Co., Silver Spring, Md.
RELIABILITY AND AVAILABILITY OF A REPAIRABLE r/m ACTIVE REDUNDANCY SYSTEM
J. P. Signoret Jun. 1974 30 p refs Transl. into ENGLISH of CEA (Paris), SETS Report No. 20, Aug. 1973 30 p Sponsored by AEC
(AEC-tr-7559) Avail: NTIS HC $3.75

A method of calculation which led to an analytical solution for the case of a system with 2/3 logic for constant failure rates is described. It provides a means of quantitatively determining the quality of a reactor protection system as a function of its components and the maintenance policy to which it is subjected. Author (NSA)

N75-14159# Grimes (W.J.) and Co., Silver Spring, Md.
FAILURE RATE COMPILATION: SCIENTIFIC REPORTS
H. P. Balfanz Dec. 1973 92 p refs Transl. into ENGLISH from the German report IRS-W-8 Sponsored by AEC
(AEC-tr-7564; IRS-W-8) Avail: NTIS HC $4.75

The failure rates of mechanical and electrical components were compiled including both numerical values and pertinent qualifying comments. Comments are given about the performance, the range of application of the components and/or the statistical data from which the failure rates have been estimated (i.e., number of observed components, the observation period, and the number of failures). When possible, the failure rates of components were classified according to their range of performance or design characteristics. A differentiation of failure rates with failure modes could only be made in a few circumstances. Because of the magnitude of data contained within the FARADA-Handbook MIL-HDBK and the VDEW-Statistic, the failure rates listed there were summarized. A general averaging of all values was not considered suitable because failure rates should be chosen for specific conditions of component application. Author (NSA)

N75-14160# Texas Technological Univ., Lubbock. Dept. of Industrial Engineering.
EMPIRICAL BAYES ESTIMATION IN QUALITY CONTROL AND RELIABILITY: AN EXPOSITION AND ILLUSTRATION
Harry F. Martz, Jr. 31 Aug. 1974 29 p refs
(Contract N00014-73-A-0434; NR Proj. 042-320)
(AD-786230; TR-2) Avail: NTIS CSCL 14/4

Two real-data illustrations of the use of Empirical Bayes estimation in quality control and reliability are given. The Empirical Bayes method is applied to the problem of estimating the outage rates for two adjacent 115 kV transmission circuits of a regional power company. Comparisons are made with standard classical and Bayesian procedures. The method is also used to obtain Empirical Bayes single-sampling attributes inspection plans that achieve specified posterior consumer and producer risks. The single-sampling plans are based on the sampling inspection history from 205 past lots of U.S. Navy material. Comparisons are made with classical sampling procedures. In both examples the Empirical Bayes method is observed to yield certain improvements over the standard procedures. Author (GRA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N75-14161 Polish Academy of Sciences, Warsaw.
CONICAL SHELLS OF RIGID-IDEAL PLASTIC MATERIAL SUBJECTED TO GREAT DEFLECTION [POWLOKI STOZKOWE Z MATERIALU SZTYWNO-IDEALNIE PLASTYCZNEGO PODDANE DUZYM UGIECIOM]
Jozef Dudyk and Maria K. Duszek 1974 28 p refs In POLISH
(Rept-21/1974) Avail: Issuing Activity

Conical shells subjected to loading by a rigid stamper in the vicinity of large deflections were analyzed. It was found that rigid-ideal plastic shells loaded with external forces remain rigid to the moment when the loading achieves extreme value, and only from that moment does the plastic deformation of shells begin. Other topics discussed include: geometric changes, boundary values, boundary conditions, membrane stresses, and momentary stresses. Transl. by M.J.S.

N75-14162 Polish Academy of Sciences, Warsaw.
PLANNING ELASTO-PLASTIC CONSTRUCTIONS AT VARIABLE LOADS [PROJEKTOWANIE KONSTRUKCJI SPREZYSTO-PLASTYCZNYCH PRZY OBCIAZENIACH ZMIENNYCH]
Jan A. Koenig 1974 137 p refs In POLISH
(Rept-24/1974) Avail: Issuing Activity

The economic (optimal) planning of elastoplastic constructions with regard to the adaptation conditions was studied. Other topics discussed include: the theory of adaptation, the influence of strengthening the material, the influence of temperature and static hardening, estimates of displacements, and limits of the theory of adaptation. Transl. by M.J.S.

N75-14163 Polish Academy of Sciences, Warsaw.
WAVE PROBLEMS IN THE THEORY OF PLASTICITY [ZAGADNIENIA FALOWE W TEORII PLASTYCZNOSCI]
Wojciech Krzysztof Nowacki 1974 210 p refs In POLISH
Avail: Issuing Activity

A system is described of partial hyperbolic differential equations of the first order of quasi-linear equations applicable to wave problems. It was found that wave problems associated with the action of intensive dynamic loads cause plastic deformation in construction materials. One-dimensional plane waves, spherical waves, cylindrical waves, plast oblong-transverse waves, and thermal stress waves are also discussed. Transl. by M.J.S.

N75-14164# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Soils and Pavements Lab.
COMPARATIVE PERFORMANCE OF STRUCTURAL LAYERS IN PAVEMENT SYSTEMS. VOLUME 1: DESIGN, CONSTRUCTION, AND BEHAVIOR UNDER TRAFFIC OF PAVEMENT TEST SECTIONS Final Report
C. D. Burns, C. L. Rone, W. N. Brabston, and H. H. Ulery, Jr. Jun. 1974 257 p refs

(Contract DOT-FA71WAI-218)
(AD-785024; FAA-RD-73-198-1-Vol-1) Avail: NTIS HC $6.50

Rigid and flexible pavement test sections were constructed to evaluate the performance of pavements incorporating a membrane-enveloped soil layer, insulating materials, chemically stabilized soil layers, and various types of surfacing including fibrous-reinforced concrete, plain portland cement concrete, and asphaltic concrete. These test sections were trafficked with 200- and 240-kip twin-tandem assemblies (Boeing 747 spacing) and a 50-kip single-wheel assembly. The design, construction, and behavior under traffic of the pavements are reported. The data will be used to determine the response of the pavement to both static and dynamic loads and to develop design and construction criteria. Author

N75-14165# Indian Inst. of Tech., Madras. Dept. of Applied Mechanics.
NON-LINEAR ANALYSIS OF SKEW PLATES WITH VARIABLE THICKNESS
R. S. Srinivasan and S. V. Ramachandran 14 Jan. 1975 30 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Jul. 1975
Avail: NTIS HC $3.75

A numerical method is presented for the large deflection analysis of skew plates with variable thickness subjected to uniformly distributed loads. The plate is clamped all around and is free to move in its own plane. The two governing nonlinear partial differential equations are derived. These are transformed into nonlinear algebraic equations by considering discrete points over the domain and making use of the integral equation of beams along the oblique coordinates. The algebraic equations are solved by the Newton-Raphson procedure. Author

N75-14166# Scientific Translation Service, Ann Arbor, Mich.
NONLINEAR EQUATIONS OF MOTION FOR THIN RODS
V. A. Svetlitskii, N. E. Baumana, and S. D. Lonomarevyn Jul. 1974 7 p refs Transl. into ENGLISH from Izv. Vysshikh Uchebn. Zavedenii, Mashinostr. (Moscow), no. 6, 1969 p 12-15 Prepared for Argonne Natl. Lab. Sponsored by AEC
(ANL-Trans-957) Avail: NTIS HC $3.25

General nonlinear equations pertaining to the longitudinal motion of a flexible rod are derived. It is assumed that the rod is not extensible, the material is physically linear, and the rotational inertia of the rod element may be neglected. Mathematical models are developed to establish the relationships between the parameters. Author

N75-14167# Sandia Labs., Albuquerque, N.Mex.
SWAP-9: AN IMPROVED STRESS WAVE ANALYZING PROGRAM
L. M. Barker and E. G. Young Jun. 1974 174 p refs Supersedes SC-RR-69-233
(Contract AT(29-1)-789)
(SLA-74-9; SC-RR-69-233) Avail: NTIS HC $6.25

The SWAP-9 computer program for solving stress-wave problems in one-dimensional strain is the result of numerous improvements to SWAP-7. The new version of SWAP retains all of the capabilities of SWAP-7, it also handles both hydrostatic and elastic-plastic materials, can incorporate such effects as work hardening, changes in elastic constants and yield strength with pressure and internal energy, and spall at a given tensile stress. In addition, SWAP-9 can treat detonations, gasses, and vaporization of solids resulting from radiant energy deposition. A number of equations of state options were written into the program to correspond to those available in the WONDY finite difference program. Simplified programming of problems, the use of any self-consistent set of units, and more efficient use of computer time also increase the usefulness of SWAP-9. The program is described, and several sample problems illustrating its use are presented. Author

N75-14168# Oak Ridge National Lab., Tenn.
EXPERIMENTAL STUDY OF THE STRESS-STRAIN PROPERTIES OF CASK MATERIALS UNDER SPECIFIED IMPACT CONDITIONS
J. H. Evans [1974] 14 p refs Presented at 4th Intern. Symp. on Packaging and Transportation of Radioact. Materials, Miami Beach, Fla., 22 Sep. 1974
(Conf-740901-6) Avail: NTIS HC $3.25

A study was undertaken to experimentally determine the plastic dynamic compressive stress-strain characteristics of mild steel and stainless steel for strains up to 0.5 in./in. The specimen was placed on a load cell and impacted with a free falling weight. The force-time data was obtained from the specimens using a special data acquisition system. A digital computer program was used to calculate the engineering stress and strain for all data points. When the dynamic stress-strain properties are compared with static and quasi-static properties, both materials exhibit a significant increase in strength. Author (NSA)

N75-14169# Babcock and Wilcox Co., Alliance, Ohio. Research Center.
CREEP FAILURE UNDER UNIAXIAL AND MULTIAXIAL STRESS CONDITIONS Annual Report, 1 Jan. - 31 Dec. 1972
C. C. Schultz and W. E. Leyda 15 Mar. 1974 82 p refs Sponsored by AEC Prepared for ORNL
(Contract ORNL-3654)
(ORNL-SUB-3654-1; LR:72:4213-01:1) Avail: NTIS HC $4.75

Results of studies on accumulation of creep damage and the evaluation of methods of predicting creep failure under conditions of multiaxial stresses and time-dependent loading are presented. The program includes both uniaxial and multiaxial stress-rupture testing with strain-time data obtained throughout each test. During the report period testing was on type 304 stainless steel at a constant temperature of 1100 F. Author (NSA)

N75-14170# Centre de Recherches Scientifiques et Techniques de l'Industrie des Fabrications Metalliques, Brussels (Belgium). Section Construction Metallique.
FATIGUE CRACK GROWTH OF CENTRAL NOTCHED MILD STEEL PLATES
Rudy Denys (Ghent Univ.), Patrick Herman, and William Provost May 1974 32 p refs Sponsored by Inst. pour l'Encour. de la Rech. Sci. dans l'Ind. et l'Agr.
(CRIF-MT-92) Avail: NTIS HC $3.75

The applicability of Paris' crack propagation law for mild steel with low yield point was investigated. The influence of the mean stress level on the crack growth rate was examined. Fatigue tests were carried out on two series of center cracked specimens. The crack growth was measured regularly. From the results of the first test series, it is concluded that the crack propagation law of Paris is readily applicable for mild steels. The results of the second series show that the mean stress level definitely has an influence on the crack growth rate. Author (ESRO)

N75-14171# Technische Hochschule, Aachen (West Germany). Lab. fuer Ultraschall.
INFLUENCE OF PHASE ADAPTATION ON ULTRASONIC TRANSDUCERS UNDER HIGH STATIC LOADS Final Report [UEBER DEN EINFLUSS DER PHASENANPASSUNG BEI BELASTUNG VON ULTRASCHALLUEBERTRAGERN MIT HOHEN STATISCHEN KRAEFTEN ABSCHLUSSBERICHT]
R. Pohlman and L. Semieniuk Apr. 1974 35 p refs In GERMAN
(Contract Po-45/55)
Avail: NTIS HC $3.75

The objective was to improve the deformation processes in metals and plastic bodies by means of ultrasonic waves. The problem in applying this method to deformative processes in bodies with a large mass is that the ultrasonic vibration phases out for high contact pressures, thus causing an adaptation problem. Adaptation conditions were theoretically and experimentally investigated. If the adaptation conditions are chosen so that the vibrations are not damped even for high static loading, an additional plastification effect is noted. Surface conditions do not play an important role. The desired effect occurs only in the direct neighborhood of the pressure bulge. ESRO

N75-14172# Technological Lab. RVO-TNO, Rijswijk (Netherlands).
DUCTILITY FACTOR FOR REINFORCED CONCRETE PLATES [DUCTILITY-FACTOR BIJ GEWAPEND BETONNEN PLATEN]

W. H. F. C. Eschbach 1 Apr. 1974 74 p In DUTCH
(Contracts E-3140 (9628); A73/KL/077)
(TL-1974-6; TDCK-64418) Avail: NTIS HC $4.25

The analytic solution of the plate equation for dynamically loaded plates was used to determine the behavior of the plate and the expected yield pattern. Calculations were carried out for homogeneous isotropic linear elastic plate structures, i.e. each point of the plate contains the same material. Material properties are similar in all directions, and there is a linear relationship between stresses and deformations. The behavior of a rectangular completely clamped plate and a rectangular free lying plate was studied. Investigation of the yield mechanism using the solution of the differential equation leads to a lower limit for the ductility factor. To determine more accurately the ductility factor, it is necessary to develop computerized methods in which the elastoplastic behavior of the plate can be described. ESRO

N75-14173# AEG-Telefunken, Frankfurt am Main (West Germany). Inst. fuer Metallische Werkstoffe.

INFLUENCE OF STRESS RELIEF ANNEALING ON THE MECHANICAL PROPERTIES AND METALLURGIC STRUCTURE OF FINE GRAINED TEMPERATURE RESISTANT STRUCTURAL STEELS [EINFLUSS DES SPANNUNGSARMGLUEHENS AUF DIE MECHANISCHEN EIGENSCHAFTEN UND DAS GEFUEGE VON WARMFESTEN FEINKORNBAUSTAEHLEN]

K. Detert, Rabindranath Banga, and Wolfgang Bertram Bonn Bundesmin. fuer Forsch. und Technol. Oct. 1974 104 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-25) Avail: NTIS HC $5.25; ZLDI, Munich 21,45 DM

The structure of coarse-grained heat-affected welded zones was simulated by heating up to 1300 C the fine grained temperature resistant structural steels 17MnMoV 6 4, 17MnNiMoV 5 4, 17MnNiMo(Nb) 6 6, 22Ni rMo 3 7, 17MnNiMo 5 4, and 17Ni rMo 10 6, followed by quenching. All the steels with the overheated structure failed in a creep test with small elongation at 600 C. Only the V and Nb steels show decreased ductility during isothermal annealing at 600 C. ESRO

N75-14174# Army Materials and Mechanics Research Center, Watertown, Mass.

WORK-IN-PROGRESS PRESENTED AT THE ARMY SYMPOSIUM ON SOLID MECHANICS, 1974: THE ROLE OF MECHANICS IN DESIGN-STRUCTURAL JOINTS Final Report

Sep. 1974 26 p Presented at the 1974 Army Symp. on Solid Mech., Bass River, Mass., 10-12 Sep. 1974
(AD-786524; AMMRC-MS-74-9) Avail: NTIS CSCL 13/5

This document contains abstracts of presentations made at the Work-In-Progress Session of the Army Symposium on Solid Mechanics, 1974. These sessions were comprised of a series of brief presentations and discussions of current (but not necessarily complete) research relating to the theme of the symposium: The Role of Mechanics in Design - Structural Joints. This meeting was held at Bass River (Cape Cod), Massachusetts on 10-12 September 1974. The proceedings of this symposium are published in a companion document, Army Materials and Mechanics Research Center Monograph Series Report, AMMRC MS 74-8 dated September 1974. GRA

N75-14175# Army Foreign Science and Technology Center, Charlottesville, Va.

SOME INVERSE PROBLEMS IN THE FLEXURE OF ORTHOTROPIC SLOPING SHELLS

N. S. Ganiev 19 Feb. 1974 10 p refs Transl. into ENGLISH from Tr. Vesesoyuznaya Konf. po Teorii Plastin i Obolochek, 7th (USSR), 1969
(AD-785981; FSTC-HT-23-1646-73) Avail: NTIS CSCL 20/11

The article considers the solution of inverse boundary value problems in nonlinear theory for orthotropic sloping shells. GRA

N75-14176# Army Foreign Science and Technology Center, Charlottesville, Va.

A STUDY OF SINGLE FREQUENCY OSCILLATIONS IN MECHANICAL SYSTEMS DESCRIBED BY ONE DIMENSIONAL BOUNDARY VALUE PROBLEMS WITH NONLINEAR BOUNDARY CONDITIONS

B. I. Moseenkov 22 Feb. 1974 18 p refs Transl. into ENGLISH from Primenenie Theorii Nalineinrh Kolebanii v Makhanike, (USSR), v. 3, 1970 p 478-492
(AD-785975; FSTC-HT-23-1645-73) Avail: NTIS CSCL 20/11

In the study of single-frequency oscillations the technique of constructing the appropriate solutions is developed for one-dimensional mixed and boundary value problems described by the quasiwave equation with two non-linear boundary conditions. The asymptotic methods of N. N. Bogolyubov and Y. A. Mitropolskiy are extended to the class of problems mentioned above. This technique can be applied with some modifications to the study of single-frequency regimes of stationary and non-stationary rod oscillations, for which the corresponding boundary value problems may contain, in the general case, four quasilinear boundary conditions. GRA

N75-14177# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.

APPLICATION OF TRILINEAR COORDINATES TO VIBRATING TRIANGULAR PLATES WITH EXPERIMENTAL VERIFICATION

R. Williams, Y. T. Yeow, and H. F. Brinson Jul. 1974 36 p refs
(Contract DAAF07-69-C-0444)
(AD-786767; VPI-E-74-15) Avail: NTIS CSCL 20/11

A general description and a historical discussion of trilinear coordinates is given. These coordinates are then used to develop the solution of a simple supported freely vibrating equilateral triangular plate. The solution gives fundamental frequencies, mode shapes, nodal lines and a general expression for displacements. An experimental program is described to validate the analytical solution. Nodal lines, mode shapes and displacements are determined by holographic interferometry and compared to theoretical results. Excellent agreement is obtained. A second experimental technique, a fiber optic device, is used to determine displacements with the results being compared to the displacements obtained by both theoretical and holographic analysis. Author (GRA)

N75-14178# Massachusetts Univ., Amherst. School of Engineering.

INFLUENCE OF SHEAR ON NON-LINEAR BEHAVIOR OF AN ORTHOTROPIC THIN SHALLOW RECTANGULAR PANEL

Pei-Kao Hsueh and William A. Nash Jul. 1974 103 p refs
(Contract N00014-68-A-0146; NR Proj. 200-016)
(AD-785914; UM-74-2) Avail: NTIS CSCL 20/11

Using the energy method and a variational theorem, a set of force equilibrium differential equations as well as the required natural boundary conditions for an orthotropic shallow rectangular panel acting in the non-linear large deflection range with a consideration of transverse shear deformation effects have been derived. A systematic numerical approach is developed to solve these equations. The numerical solutions are obtained by using the finite difference approximation to form the finite difference equations and then the Newton-Raphson iteration scheme is employed to solve this system of nonlinear simultaneous algebraic equations. Detail has been given as to the application of the procedures developed to different load and support conditions for given shallow shell geometries. Snap-through buckling loads for spherical panels with a rectangular plan-form base have been computed for a wide range of shell geometries for both isotropic and orthotropic materials. Snap-through buckling loads for cylindrical panels are also demonstrated to show the broad capability of the computer program. (Modified author abstract) GRA

N75-14179# Virginia Univ., Charlottesville. Applied Mechanics Group.

A METHOD OF ANALYSIS OF LINE STRUCTURES BY TRANSFER MATRICES DERIVED FROM FINITE ELEMENTS Final Report

Walter D. Pilkey and John Kenneth Haviland 1 Sep. 1974 30 p refs

(Contract N00014-69-A-0060-0009)
(AD-785001; TR-74-1) Avail: NTIS CSCL 20/11

It is shown that transfer matrices can be derived from finite elements to provide an efficient approach for structural analysis of complicated structures with a principal direction. This new substructing technique is particularly appropriate for ship structures. The method is demonstrating using transfer matrices formed with the aid of the finite element program ELAS.
Author (GRA)

N75-14180# British Steel Corp., Sheffield (England). Information Services.
THE NOTCH TOUGHNESS OF SUBMERGED ARC WELD METAL IN MICRO-ALLOYED STRUCTURAL STEELS
J. G. Garland and P. R. Kirkwood Aug. 1974 63 p refs
(PB-236369/5; GS/PROD/499/1/74/C) Avail: NTIS HC $4.25 CSCL 11F

The influence of Nb on the toughness of submerged arc welds has been examined using the Charpy V-notch impact test. The behavior of the weld metals studied was rationalized in terms of the effect of Nb upon the structure of the weld bead and in particular its role in promoting the formation of retained martensitic micro-constituents in the acicular ferrite matrix. These have been shown to play an important part in determining the as-welded and stress-relieved properties of the deposit. A model has been developed and practical recommendations are made. (Modified author abstract) GRA

42 GEOSCIENCES (GENERAL)

N75-14181# Laboratorio de Acustica e Sonica, Sao Paulo (Brazil).
SOUND AND NOISE MEASUREMENTS AND OCTAVE BAND ANALYSIS IN PIECE OF LAND INTENDED FOR INDUSTRIAL INSTALLATION
L. X. Napomucano 20 Jan. 1974 14 p In PORTUGUESE; ENGLISH abstract
Avail: NTIS HC $3.25

The results of acoustic measurement and octave band analysis for land intended to be used for industrial installation are analyzed. Noise levels nearby points are also presented. Author

N75-14182# Royal Aircraft Establishment, Farnborough (England).
LIGHTNING STRIKES IN AIRCRAFT AND MISSILES. THE NEED FOR PROTECTION AGAINST LIGHTNING
K. Hoffmann Oct. 1974 17 p refs Transl. into ENGLISH from Wehrtechnik (West Germany), v. 1/74, 1974 p 27-31
(RAE-Lib-Trans-1794; BR44350) Avail: NTIS HC $3.25

The generation and characteristics of the lightning discharge process and the effects to be anticipated are described. The current levels reached are given and discussed, together with the possible damage and the precautionary measures available.
Author

N75-14183# Sandia Labs., Albuquerque, N.Mex.
CYLINDRICAL CAVITY EXPANSION IN A LOCKING SOIL
F. R. Norwood Jul. 1974 34 p refs
(Contract AT(29-1)-789)
(SLA-74-0201) Avail: NTIS HC $3.75

The large deformation, dynamic cylindrical cavity expansion theory is developed for an isotropic, homogeneous, locking soil. The rate of cavity expansion is prescribed in terms of the nose shape, and the amount of work done in expanding to a given radius is calculated. The theory is related to the maximum penetration depth achieved by an impacting projectile with either a cone or an ogive for a nose. Aut hor

N75-14184# Nielsen Engineering and Research, Inc., Mountain View, Calif.
APPLICATION OF BOUNDARY-LAYER THEORY TO DISPERSION IN WELL-MIXED ESTUARIES
Gary D. Kuhn and Jack N. Nielsen Sep. 1974 135 p refs
(Contract DI-14-31-0001-3698)
(PB-236288/7; NEAR-TR-63; OWRR-C-3189(3198)(2)) Avail: NTIS HC $5.75 CSCL 08H

A theory is presented for calculating the complete velocity field of long, well-mixed estuaries which vary in cross section. The method is based on boundary-layer theory in that the vertical profiles of velocity in the estuary are assumed to have the analytical form characteristic of turbulent boundary layers. That analytical form is used to calculate the vertical profiles of velocity after the lateral variation of the vertically averaged velocity and bottom shear stress have been calculated with the help of data obtained from a tidal model. Comparison of calculated velocity distributions with velocities measured in a real estuary indicate that the method gives good estimates of the complete velocity distributions in real estuaries. (Modified author abstract) GRA

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

N75-14185*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Progress Report, Oct. 1974
George A. Maul, Principal Investigator Oct. 1974 2 p EREP
(NASA Order T-4713-B)
(E75-10031; NASA-CR-140726) Avail: NTIS HC $3.25 CSCL 08J

There are no author-identified significant results in this report.

N75-14186*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Progress Report, Nov. 1974
George A. Maul, Principal Investigator Nov. 1974 2 p EREP
(NASA Order T-4713-B)
(E75-10067; NASA-CR-141021) Avail: NTIS CSCL 08J

There are no author-identified significant results in this report.

N75-14187*# Cornell Univ., Ithaca, N.Y. Dept. of Natural Resources.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES Progress Report, Nov. 1974
Ernest E. Hardy, Principal Investigator 30 Nov. 1974 1 p EREP
(Contract NAS9-13364)
(E75-10068; NASA-CR-141022) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-14188*# Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.
CONTRIBUTION OF SPACE PLATFORMS TO A GROUND AND AIRBORNE REMOTE SENSING PROGRAMME OVER ACTIVE ITALIAN VOLCANOES
R. Cassinis, Principal Investigator, G. M. Lechi, C. M. Marino, and A. M. Tonelli 5 Nov. 1974 41 p refs Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 EREP
(E75-10069; NASA-CR-141102) Avail: NTIS HC $3.75 CSCL 08F

The author has identified the following significant results. A method has been suggested for the forecasting of the lateral eruptions of Mount Etna, through the multispectral analysis of the vegetation behavior. Unknown geological lineaments which seem to be related to deep crustal movements have been discovered using the ERTS-1 imagery. Results in the geological field were obtained in the study of the general structure of the Alpine range. In the field of official vegetation classification, ERTS-1 images were used for a preliminary study of rice fields

in northern Italy. Very good experimental results have been obtained using the Skylab multispectral photographs. In the field of hydrogeology and soil type discrimination discoveries of unknown paleoriver beds have been made in the northeastern part of the Po Valley using the multispectral imagery of SL3. The superior resolution of Skylab was a fundamental element for the success of this investigation.

N75-14189*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Letter Progress Report No. 12, Sep. 1974
Arun Sobti, Richard K. Moore, Fawwaz T. Ulaby, John C. Barr, Evan Davison, Chia Sung, Saad Ulaby, and Tom Burton Sep. 1974 4 p EREP
(Contract NAS9-13331)
(E75-10070; NASA-CR-141101) Avail: NTIS HC $3.25 CSCL 05B

There are no author-identified significant results in this report.

N75-14190*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO, USING SKYLAB EREP DATA Monthly Progress Report, Nov. 1974
Keenan Lee, Principal Investigator 19 Dec. 1974 5 p EREP
(Contract NAS9-13394)
(E75-10071; NASA-CR-141100) Avail: NTIS HC $3.25 CSCL 08G

There are no author-identified significant results in this report.

N75-14191*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Nov. 1974
Roger M. Hoffer, Principal Investigator Nov. 1974 4 p EREP
(Contract NAS9-13380)
(E75-10072; NASA-CR-141099) Avail: NTIS HC $3.25 CSCL 05B

The author has identified the following significant results. The utility of the middle infrared portion of the spectrum for snow cover mapping has been demonstrated. Also, the S-192 thermal band seems to have a higher thermal detectivity than previously estimated and predicted.

N75-14192*# Kansas Univ. Center for Research, Inc., Lawrence. Atmospheric Science Lab.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, Nov. 1974
Joe R. Eagleman, Principal Investigator and Wen C. Lin Nov. 1974 14 p EREP
(Contract NAS9-13273)
(E75-10073; NASA-CR-141098; TR-239-20) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. The high correlations between radiometric temperature and soil moisture content are shown to remain quite high for independent footprints of the S194 sensor. Since an analysis based on overlapping footprints had previously been reported with a high correlation, it was necessary to verify that the correlation did not arise from dependent data.

N75-14193*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, Nov. 1974
Paul M. Merifield, Principal Investigator 5 Dec. 1974 2 p EREP
(Contract NAS2-7698)
(E75-10074; NASA-CR-141097; MPR-18) Avail: NTIS HC $3.25 CSCL 08E

There are no author-identified significant results in this report.

N75-14194*# Kansas Univ., Lawrence.
SKYLAB STUDY OF WATER QUALITY Progress Report, Sep. - Nov. 1974
Harold L. Yarger, Principal Investigator and James R. McCauley Nov. 1974 7 p EREP
(Contract NAS9-13271)
(E75-10075; NASA-CR-141096) Avail: NTIS HC $3.25 CSCL 08H

The author has identified the following significant results. Radiometric data derived from S-190A photography appears to correlate reasonably well with suspended solids without the need of rationing the radiances of different bands.

N75-14195*# Nevada Univ., Reno. Mackay School of Mines.
THE GREAT BASIN INVESTIGATION Monthly Progress Report, Nov. 1974
Jack G. Quade, Principal Investigator Nov. 1974 2 p EREP
(Contract NAS9-13274)
(E75-10076; NASA-CR-141095) Avail: NTIS HC $3.25 CSCL 08E

There are no author-identified significant results in this report.

N75-14196*# South Dakota State Univ., Brookings. Remote Sensing Inst.
DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM REMOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL Monthly Progress Report, Nov. 1974
Victor I. Myers, Principal Investigator 20 Dec. 1974 2 p EREP
(Contract NAS9-13337)
(E75-10077; NASA-CR-141094) Avail: NTIS HC $3.25 CSCL 08F

There are no author-identified significant results in this report.

N75-14197*# Geological Survey, Reston, Va.
CARTOGRAPHIC EVALUATION OF SKYLAB-A S-192 SCANNER IMAGES Quarterly Progress Report, 1 Aug. - 31 Oct. 1974
John D. McLaurin, Principal Investigator 31 Oct. 1974 3 p EREP
(NASA Order T-4111-B)
(E75-10078; NASA-CR-141093) Avail: NTIS HC $3.25 CSCL 08B

There are no author-identified significant results in this report.

N75-14198*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, Nov. 1974
David L. Tingey, Principal Investigator Nov. 1974 1 p EREP
(Contract NAS9-13303)
(E75-10079; NASA-CR-141092) Avail: NTIS HC $3.25 CSCL 04A

There are no author-identified significant results in this report.

N75-14199*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Letter Progress Report No. 13, Oct. 1974
Arun Sobti Oct. 1974 30 p EREP
(Contract NAS9-13331)
(E75-10080; NASA-CR-141104) Avail: NTIS HC $3.75 CSCL 05B

The author has identified the following significant results. The Skylab S-193 radiometer/scatterometer collected thousands of measurements of scattering coefficient and brightness temperature over various parts of the United States during the summer of 1973 at angles of incidence between vertical and

about 45 deg. These measurements have been combined to produce histograms of the response at each of several angles within this range, and to establish average scattering coefficient vs angle curves with 10% and 90% exceedance levels as well. The variation of the radiometeric measurements is primarily in the region from 255 K to 285 K, with very few measurements giving values down to and even below 200 K. The scattering coefficient varies, for the mean, from about 0 db at 1 deg off vertical to a low in the neighborhood of -10 db at 45 deg. The variability of the scattering coefficient measurements with this coarse resolution sensor is surprisingly small. The number of distinguishable levels is slightly more for the scatterometer than for the radiometer, but the amount of variation in brightness temperature caused by the physical temperature of the ground is enough so that the scatterometer can be used to distinguish significantly more meaningful levels than the radiometer.

N75-14200*# Environmental Research and Technology, Inc., Lexington, Mass.
STUDY TO DEVELOP IMPROVED SPACECRAFT SNOW SURVEY METHODS USING SKYLAB/EREP DATA Quarterly Progress Report, 15 Sep. - 15 Dec. 1974
James C. Barnes, Principal Investigator Dec. 1974 5 p EREP
(Contract NAS9-13305)
(E75-10081; NASA-CR-141105; P-412-10; QPR-7) Avail: NTIS HC $3.25 CSCL 08L

There are no author-identified significant results in this report.

N75-14201*# Ohio Dept. of Economic and Community Development, Columbus.
THE APPLICATION OF SKYLAB EREP DATA FOR LAND USE CLASSIFICATION AND MAPPING IN THE CLEVELAND AND COLUMBUS AREAS
David C. Sweet, Principal Investigator, Paul Pincura, George E. Wukelinc, Joachim G. Stephan, Harry E. Smail, and Thomas F. Ebbert Apr. 1974 28 p Prepared in cooperation with Battelle Columbus Labs., Ohio Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(NASA Order C-21372-C)
(E75-10083; NASA-CR-141107) Avail: NTIS HC $3.75 CSCL 08B

There are no author-identified significant results in this report.

N75-14202*# Agricultural Research Service, Weslaco, Tex.
IRRIGATION SCHEDULING, FREEZE WARNING AND SOIL SALINITY DETECTING Monthly Progress Report, Dec. 1974
Craig L. Wiegand, Principal Investigator Dec. 1974 5 p EREP
(NASA Order T-4105-B)
(E75-10084; NASA-CR-141108; MPR-12) Avail: NTIS HC $3.25 CSCL 02C

There are no author-identified significant results in this report.

N75-14203*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 1: SUMMARY
George A. Hazelrigg, Jr. and Klaus P. Heiss 20 Dec. 1974 82 p
(Contract NASw-2580)
(NASA-CR-141268; Rept-74-2002-10-1-Vol-1) Avail: NTIS HC $4.75 CSCL 05C

An overview of the ERTS program is given to determine the magnitude of the benefits that can be reasonably expected to flow from an Earth Resources Survey (ERS) Program, and to assess the benefits foregone in the event of a one or two-year gap in ERS services. An independent evaluation of the benefits attributable to ERS-derived information in key application areas is presented. These include two case studies in agriculture-distribution, production and import/export, and one study in water management. The cost-effectiveness of satellites in an ERS system is studied by means of a land cover case study. The annual benefits achieveable from an ERS system are measured by the in-depth case studies to be in the range of $430 to $746 million. Benefits foregone in the event of a one-year gap in ERS service are estimated to be $147 to $220 million and $274 to $420 million for a two-year gap in ERS service. Author

N75-14204*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING BY SATELLITE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 2: SOURCE DOCUMENT
John Andrews, Alan Donziger, Jr. George A. Hazelrigg, Klaus Heiss, Francis Sand, and Peter Stevenson 20 Dec. 1974 186 p refs
(Contract NASw-2580)
(NASA-CR-141193; Rept-74-2002-10-2-Vol-2) Avail: NTIS HC $7.00 CSCL 05C

The economic value of an ERS system with a technical capability similar to ERTS, allowing for increased coverage obtained through the use of multiple active satellites in orbit is presented. A detailed breakdown of the benefits achievable from an ERS system is given and a methodology for their estimation is established. The ECON case studies in agriculture, water use, and land cover are described along with the current ERTS system. The cost for a projected ERS system is given. Author

N75-14205*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 3: INTENSIVE USE OF LIVING RESOURCES: AGRICULTURE. PART 1: OVERVIEW
Alain L. Kornhauser and Lawrence B. Wilson 20 Dec. 1974 148 p
(Contract NASw-2580)
(NASA-CR-141265; Rept-74-2002-10-Vol-3-Pt-1) Avail: NTIS HC $5.75 CSCL 05C

Potential economic benefits obtainable from a state-of-the-art ERS system in the resource area of intensive use of living resources, agriculture, are studied. A spectrum of equal capability (cost saving), increased capability, and new capability benefits are quantified. These benefits are estimated via ECON developed models of the agricultural marketplace and include benefits of improved production and distribution of agricultural crops. It is shown that increased capability benefits and new capability benefits result from a reduction of losses due to disease and insect infestation given ERS's capability to distinguish crop vigor and from the improvement in world trade negotiations given ERS's worldwide surveying capability. Author

N75-14206*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 3: INTENSIVE USE OF LIVING RESOURCES, AGRICULTURE. PART 2: DISTRIBUTION EFFECTS
David F. Bradford and Harry H. Kelejian 31 Oct. 1974 115 p refs
(Contract NASw-2558)
(NASA-CR-141194; Rept-74-2002-10-Vol-3-Pt-2) Avail: NTIS HC $5.25 CSCL 05C

The results of an investigation of the value of improving information for forecasting future crop harvests are described. A theoretical model is developed to calculate the value of increased speed of availablitiy of that information. The analysis of U.S. domestic wheat consumption was implemented. New estimates of a demand function for wheat and of a cost of storage function were involved, along with a Monte Carlo simulation for the wheat spot and future markets and a model of market determinations of wheat inventories. Results are shown to depend critically on the accuracy of current and proposed measurement techniques. Author

N75-14207*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 3: INTENSIVE USE OF LIVING RESOURCES, AGRICULTURE.

PART 3: THE INTEGRATED IMPACT OF IMPROVED (ERS) INFORMATION ON US AGRICULTURAL COMMODITIES
Andrew D. Seidel 20 Dec. 1974 159 p refs
(Contract NASw-2580)
(NASA-CR-141262; Rept-74-2002-10-Vol-3-Pt-3) Avail: NTIS HC $6.25 CSCL 05C

The economic value of information produced by an assumed operational version of an earth resources survey satellite of the ERTS class is assessed. The theoretical capability of an ERTS system to provide improved agricultural forecasts is analyzed and this analysis is used as a reasonable input to the econometric methods derived by ECON. An econometric investigation into the markets for agricultural commodities is summarized. An overview of the effort including the objectives, scopes, and architecture of the analysis, and the estimation strategy employed is presented. The results and conclusions focus on the economic importance of improved crop forecasts, U.S. exports, and government policy operations. Several promising avenues of further investigation are suggested. Author

N75-14208*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 4: FORESTRY, WILDLIFE AND RANGELAND
John Andrews and Peter Stevenson 31 Oct. 1974 136 p refs
(Contract NASw-2580)
(NASA-CR-141263; Rept-74-2002-10-Vol-4) Avail: NTIS HC $5.75 CSCL 05C

The economic value of ERS information in the resource management area of extensive use of living resources, forestry, wildlife, and rangeland, is determined. Timber and forage resources are quantitatively evaluated. It is shown that these resources have economic value in the tens of billions of dollars, but the economic benefits of improved management of the forests and rangelands are not limited to efficiency in the production of these commercial resources. Multiple-use values including watershed, wildlife, and recreation are also involved. Author

N75-14209*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 5: INLAND WATER RESOURCES
Elliot Wetzler, Wes Peterson, and Martin Putnam 31 Oct. 1974 413 p
(Contract NASw-2580)
(NASA-CR-141269; Rept-74-2002-10-Vol-5) Avail: NTIS HC $10.50 CSCL 08H

The economic value of an ERTS system in the area of inland water resources management is investigated. Benefits are attributed to new capabilities for managing inland water resources in the field of power generation, agriculture, and urban water supply. These benefits are obtained in the area of equal capability (cost savings) and increased capability (equal budget), and are estimated by applying conservative assumptions to Federal budgeting information, Congressional appropriation hearings, and ERTS technical capabilities. Author

N75-14210*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 6: LAND USE. PART 1: INTRODUCTION AND OVERVIEW
Keith R. Lietzke and Peter A. Stevenson 20 Dec. 1974 56 p
(Contract NASw-2580)
(NASA-CR-141266) Avail: NTIS HC $4.25 CSCL 05C

The utility of an ERS system as an effective tool in land use management is analyzed. The potential new capabilities of a space based ERS system are qualitatively examined. A variety of resource management functions are postulated within which ERTS activities might occur and the present ERS investigations in these areas are outlined. Author

N75-14211*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 6: LAND USE. PART 2: THE ROLE OF ERTS IN THE ESTABLISHMENT AND UPDATING OF A NATIONWIDE LAND COVER INFORMATION SYSTEM
Robert J. Christie 31 Oct. 1974 302 p
(Contract NASw-2558)
(NASA-CR-141267) Avail: NTIS HC $9.25 CSCL 05C

The utility of an ERS system as an effective tool in land use management is analyzed. The cost effectiveness of satellites as a component of an ERS system is presented based on various projected levels of demand. It is indicated that a cost savings potential of $7.9 to $37.1 million annually is attributable to the inclusion of ERS-like satellites in the ERTS system. Author

N75-14212*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 7: NONREPLENISHABLE NATURAL RESOURCES: MINERALS, FOSSIL FUELS AND GEOTHERMAL ENERGY SOURCES
Keith R. Lietzke 31 Oct. 1974 85 p refs
(Contract NASw-2580)
(NASA-CR-141264; Rept-74-2002-10-Vol-7) Avail: NTIS HC $4.75 CSCL 05C

The application of remotely-sensed information to the mineral, fossil fuel, and geothermal energy extraction industry is investigated. Public and private cost savings are documented in geologic mapping activities. Benefits and capabilities accruing to the ERS system are assessed. It is shown that remote sensing aids in resource extraction, as well as the monitoring of several dynamic phenomena, including disturbed lands, reclamation, erosion, glaciation, and volcanic and seismic activity. Author

N75-14213*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 8: ATMOSPHERE
Richard Miles and Gregg Fawkes 31 Oct. 1974 96 p
(Contract NASw-2580)
(NASA-CR-141191; Rept-74-2002-10-Vol-8) Avail: NTIS HC $4.75 CSCL 05C

The economic value of an ERS system in the resource area of atmosphere is determined. Benefits which arise from air pollution and cloud observations correlated to ground stations are discussed along with cost savings associated with air pollution monitoring by satellite. Social benefits due to more precise knowledge of the effects of pollution are presented. Author

N75-14214*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 9: OCEANS
Keith R. Lietzke 20 Dec. 1974 134 p
(Contract NASw-2580)
(NASA-CR-141270; Rept-74-2002-10-Vol-9) Avail: NTIS HC $5.75 CSCL 05C

The impact of remote sensing upon marine activities and oceanography is presented. The present capabilities of the current Earth Resources Technology Satellite (ERTS-1), as demonstrated by the principal investigators are discussed. Cost savings benefits are quantified in the area of nautical and hygrographic mapping and charting. Benefits are found in aiding coastal zone management and in the fields of weather (marine) prediction, fishery harvesting and management, and potential uses for ocean vegetation. Difficulties in quantification are explained, the primary factor being that remotely sensed information will be of greater benefit as input to forecasting models which have not yet been constructed. Author

N75-14215*# ECON, Inc., Princeton, N.J.
THE ECONOMIC VALUE OF REMOTE SENSING OF EARTH RESOURCES FROM SPACE: AN ERTS OVERVIEW AND THE VALUE OF CONTINUITY OF SERVICE. VOLUME 10: INDUSTRY
Keith R. Lietzke 31 Oct. 1974 36 p refs

(Contract NASw-2580)
(NASA-CR-141192; Rept-74-2002-10-Vol-10) Avail: NTIS HC $3.75 CSCL 05C

The economic benefits of an ERS system in the area of industrial resources are discussed. Contributions of ERTS imagery to the improvement of shipping routes, detection of previously unknown and potentially active faults in construction areas, and monitoring industrial pollution are described. Due to lack of economic research concerning the subject of ERS applications in this resource area the benefit estimations reported are regarded as tentative and preliminary. Author

N75-14216# European Space Research Organization, Paris (France).
EUROPEAN EARTH-RESOURCES SATELLITE EXPERIMENTS
Bruce T. Battrick, ed. and Nguyen T. Duc, ed. May 1974 469 p refs Partly in ENGLISH and partly in FRENCH Proc. of a Symp. held at Frascati, Italy, 28 Jan. - 1 Feb. 1974 Original contains color illustrations
(ESRO-SP-100) Avail: NTIS HC $11.50

Proceedings of the symposium are presented. The main topic was the use of imagery data from ERTS-1. Data processing methods were discussed for ERTS, EREP, and Skylab imagery. Applications of these data were considered in the fields of oceanography, hydrology, and glaciology; geology and geomorphology; and agriculture, forestry, and vegetation. For individual titles, see N75-14217 thrbugh N75-14253.

N75-14217 Bochum Observatory (West Germany). Inst. for Space Research.
ENVIRONMENTAL SATELLITES AND ERTS-1 IMAGERY
H. Kaminski and Anne-Marie Martin *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 1-19 refs Original contains color illustrations (For availability see N75-14216 05-43)

The application of environmental satellite data to complement ERTS-1 imagery is discussed. The first Earth Resources Technology Satellite was conceived as a non-meteorological system with a long period of repetitive coverage (18 days) and sensor bandwidths in the range of visible light and photographic infrared. Since the start of ERTS-1, it has been found necessary to complement this concept with synoptic visible and infrared imagery from environmental satellites, such as Nimbus-3 and NOAA-2. The use of this high resolution imagery is demonstrated for the recognition of thermal phenomena such as warm and cold currents in coastal seas, definition of differing layers in the atmosphere, and delineation of urban hot spots. Available examples of ERTS imagery are compared with the above to illustrate the compatibility of these sensor systems for geoscientific research. ESRO

N75-14218 Zentralstelle fuer Geo-Photogrammetrie und Fernerkundung, Munich (West Germany).
EVALUATION OF ERTS-1 DATA BY ANALOGUE AND DIGITAL TECHNIQUES
J. Bodechtel, R. H. Dittel, and R. Haydn *In* ESRO European Earth Resources Satellite Expts. May 1974 p 21-35 Original contains color illustrations (For availability see N75-14216 05-43)

Digital and analog image evaluation was performed on ERTS-1 data representing a Central European summer scene and a North Italian winter scene. A statistical analysis of the data, as first step in the evaluation process, showed strong correlation between both infrared channels for these types of landscape and these seasonal periods. For representative areas south of the Starnberg Lake near Munich, different features such as water, conifer forests, agricultural areas and particular soil category were identified by applying factor analysis. Feature identification was also performed by a digital quick-look method which considers the slope between the intensity levels for the channels of the visible and infrared spectrum caused by different reflection properties of surfaces. The results obtained digitally are compared with those obtained by analog density slicing. A hardware concept for an interactive hybrid image evaluation system is presented. Author (ESRO)

N75-14219 Research Inst. of National Defence, Stockholm (Sweden).
PROCESSING OF ERTS CCT IMAGERY OF SWEDEN. A PILOT STUDY
T. Orhaug and S. I. Aekersten *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 37-45 Original contains color illustrations (For availability see N75-14216 05-43)

Data handling, processing, and presentation problems are discussed in connection with a Swedish remote sensing program aimed at natural resources inventories and environmental monitoring. For want of large quantities of remotely sensed national data suitably recorded for automatic processing and analysis, ERTS-1 CCT's of Swedish scenes were acquired as a means of making an inventory of forest-rejuvenation areas. In addition to standard methods of computer imagery generation, a technique developed in Sweden is used. An ink-jet plotter yields a 3 color image on ordinary paper. Examples of imagery from ERTS-1 recordings are presented. ESRO

N75-14220 Sheffield Univ. (England). Dept. of Geography.
AN EVALUATION OF STEREOSCOPIC VIEWING OF ERTS AND SKYLAB IMAGES
J. L. VanGenderen *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 47-55 refs Original contains color illustrations (For availability see N75-14216 05-43)

It is shown that stereoscopic examination of orbital data can contribute to studies of spatial, spectral, and temporal variations on the imagery. The combination of true stereo parallax plus shadow parallax offers many possibilities to human interpreters for making meaningful analyses of orbital imagery. Using the procedures of stereoscopic image interpretation described, many earth scientists who have neglected the important information source that ERTS and Skylab data can be, because of their lack of expensive data-analysis equipment, should be encouraged to use the data with simple stereoscopic instruments and the analysis techniques defined. Author (ESRO)

N75-14221 Hunting Surveys, Ltd., Boreham•Wood (England).
THE POTENTIAL OF SMALL-SCALE MAPPING FROM ERTS-1 IMAGERY
H. Chisman *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 57-59 (For availability see N75-14216 05-43)

Comparison tests are to be made between existing mapping, the accuracy and completeness of which can be relied upon, and that obtained directly from ERTS imagery with a minimum of control. By comparing satellite coverage and existing mapping the completeness of detail that can be interpreted, and the locational accuracy of interpreted detail can be examined. The effectiveness of the different spectral band images for the interpretation of different features will be evaluated and also photogrammetric and image enhancement techniques applied to the imagery that may be useful in map printing. If satisfactory results are obtained from these studies, the techniques will be applied to mapping in those parts of the world where present maps are inadequate. Author (ESRO)

N75-14222 International Training Centre for Aerial Survey, Delft (Netherlands).
THE ITC 8-IMAGE COMPARATOR AND ITS POSSIBLE USE IN ERTS AND EREP INVESTIGATIONS
S. A. Hempenius *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 61-70 refs (For availability see N75-14216 05-43)

A multi-image projector is described for ERTS and EREP imagery. The single-lamp viewer projects up to eight, three times enlarged, 60 mm by 60 mm transparencies through one objective onto an almost horizontal table-top screen. Used as a color additive viewer, any subset of the eight multispectral images can be presented; the intensity and color of the individual images can be selected independently (red, green, blue, or white). In the flickering mode, the series of single images, or of pairs, triplets, etc. can be thrown onto the screen in slow or rapid succession (frequency adjustable up to 30 Hz), the time constant of the shutters being about 5 msec. The number of images per cycle (1 to 8), the presentation time per image, the temporal overlap of the images, the color, and the intensity can be set independently. Visual faculties to be explored for discrimination and identification on multispectral and multi-temporal ERTS images include color viewing, detection of flickering fields, and disappearance of fluctuations when passing the critical flicker frequency. Author (ESRO)

N75-14223 Institut de Geographie, Aix en Provence (France). Centre de Teledetection.

OPTICAL PROCESSING OF ERTS-1 (MSS) IMAGES: EXAMPLES FOR THE ARCACHON BASIN AND RHONE DELTA

J. Pouquet, J. O. Palgen (Earth Satellite Corp., Washington, D.C.), and P. A. Rey (Toulouse Univ.) *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 71-74 Original contains color illustrations (For availability see N75-14216 05-43)

Conventional examples showing the possibilities of density slicing or color-composite techniques are presented. It is emphasized, however, that these old procedures should only be used as a first approach; only correct digitization (reflectance, radiance temperature values according to wavelength) is likely to yield valuable scientific results. Author (ESRO)

N75-14224 East Anglia Univ., Norwich (England).

GENERALISATION OF ERTS DATA FOR GLOBAL-SCALE INVESTIGATIONS

I. E. Hill, A. C. Armstrong, and K. M. Clayton *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 75-80 (For availability see N75-14216 05-43)

A computer-based system is described for analysis of the imagery from the ERTS project. Information contained in ERTS imagery is of use on many spatial scales. To achieve a global scale, generalization to units of the order of 50 km by 50 km is necessary. This involves problems of both data retrieval and efficient and meaningful generalization. Some results of using a computer system based on analysis of the grey-scale histograms are presented and possibilities for future developments are discussed. Author (ESRO)

N75-14225 Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).

REDUCTION OF INFORMATION REDUNDANCY IN ERTS-1 AND EREP DATA. A PROPOSAL FOR AN EXPERIMENTAL STUDY

D. Davidts and A. Loeffler (Ges. fuer Weltraumforsch.) *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 81-91 refs (For availability see N75-14216 05-43)

An experiment is discussed for measuring the information density of remotely sensed data collected from different altitudes (low-flying aircraft, high-altitude aircraft, Spacelab, ERTS, EREP) and for determining the redundancy with respect to the final output of the interpreter and his information needs and processing capabilities. Author (ESRO)

N75-14226 Telespazio, S.p.A., Rome (Italy).

DIGITAL LAND-USE CLASSIFICATION USING AN ERTS-1 IMAGE

B. Ratti and F. Capozza *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 93-105 refs (For availability see N75-14216 05-43)

Initial work on digital land use classification was carried out utilizing an ERTS-1 MSS frame for an area centered on Rome. The high variability of ground cover types, inherent in the region under investigation, had led to use clustering (i.e. unsupervised) techniques rather than supervised techniques, which call for acquisition of substantial amounts of ground-truth information to be effective. In this initial approach, a simplified clustering algorithm was used. The ground cover types were divided into 12 classes, plus one class for points not assigned to any of these 12. The region classified covers approximately 1000 sq km. The results were very encouraging. Further work is being carried out to improve the clustering procedures, with accompanying improvements in classification accuracy. Author (ESRO)

N75-14227 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Satellitenelektronik.

MAPPING OF WATER BODIES IN NORTHERN GERMANY FROM ERTS TAPES

G. Kritikos, B. Sahai, and E. Triendl *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 107-119 (For availability see N75-14216 05-43)

Computer-compatible magnetic tapes carrying ERTS MSS data pertaining to northern Germany were examined with the aim of making a classification map of the water bodies in the region. A digital picture processing system was used to reconstruct and process the pictures. The water bodies that are not clearly distinguishable in the individual spectral bands because of unwanted background such as clouds and shadows can be demarcated clearly by taking the difference between intensities in different spectral bands. Using ratio mapping and other techniques, an automatic classification map of the water bodies in the region has been prepared. Author (ESRO)

N75-14228 Ecole Nationale Superieure du Petrole et des Monteurs, Rueil-Malmaison (France).

RECENT AND PRESENT SEDIMENTATION COMPLEXITY OF THE RHONE DELTA AND THE FRENCH MEDITERRANEAN COAST (GOLION PROJECT) [COMPLEXITE DE LA SEDIMENTATION RECENTE ET ACTUELLE DU DELTA DU RHONE ET DE LA COTE MEDITERRANEENNE FRANCAISE (PROJET GOLION)]

J. P. Bertrand, M. Guy, and A. LHommer (Bureau de Rech. Geol. et Minieres, Orleans, France) *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 121-133 In FRENCH; ENGLISH summary Original contains color illustrations (For availability see N75-14216 05-43)

A number of ERTS-1 images covering the geographical zone were studied and compared with cartographic maps, aerial photographs and thermal-IR images. The old and recent sediments leave traces in the landscape which are decoded by interpreting the shapes of the clear zones forming a network against the black background representing water and humid zones (MSS bands 6 and 7). Fieldwork is currently being conducted to study the corresponding sedimentary models. The comparison of ERTS images, certain thermal-IR images and information on the flow of the Rhone provided some clarification of the mechanisms associated with river dynamics regarding current sedimentation. Author (ESRO)

N75-14229 Swiss Inst. of Meteorology, Zurich.

METEOROLOGICAL INTERPRETATION OF HIGH RESOLUTION IMAGES FOR REMOTE SENSING OF EARTH RESOURCES [INTERPRETATION METEOROLOGIQUE DES IMAGES A HAUTE RESOLUTION DESTINEES A LA TELEDETECTION DES RESSOURCES TERRESTRES]

A. Piaget *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 135-141 refs In FRENCH; ENGLISH summary (For availability see N75-14216 05-43)

It is shown that remote sensing of earth resources is very valuable to meteorology, because the very high image resolution required for remote sensing (less than 100 m) enables a study to be made of the microstructure of clouds over a relatively wide area. Another application makes use of the fine detail of the temperature distribution field. It is often possible to study the penetration of air from the plain into the valleys, or the stagnation of cold air in the dips in the ground surface. This is useful information for the protection of the environment and for the planting of new crops, to give only two examples. The extent of the snow cover and its effect on the neighboring air can only be appreciated by studying both ordinary and very high resolution images in combination. Author (ESRO)

N75-14230 Institut Geographique National, Paris (France).

INTERPRETATION OF ERTS-1 DATA FOR INVESTIGATING THE FRENCH WESTERN COASTAL ZONES (FRALIT PROGRAM) [L'INTERPRETATION DES DONNEES ERTS-1 POUR L'ETUDE DE LA FACADE OUEST DE LA FRANCE (PROGRAMME FRALIT)]

P. Demathieu and R. Brossier *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 143-150 ref In FRENCH; ENGLISH summary Original contains color illustrations (For availability see N75-14216 05-43)

Application of ERTS 1 data to a program consisting of a study of the western coastline of France covering both the sea (currents, sedimentology) and the wetlands (sea marshes) is described. The first stage of the work involved trying the maximum number of methods, ranging from conventional photointerpretation to numerical processing. In a second phase, the numerical methods were extensively developed. The ERTS-1 data proved to be a source of completely new knowledge as regards the dynamic sedimentology of coastal zones. ERTS images can also reveal

hitherto completely unknown hydrological phenomena.
Author (ESRO)

N75-14231 Ecole Nationale Superieure des Mines, Paris (France). Centre d'Informatique Geologique.
COLOUR COMPOSITES OF ERTS MULTISPECTRAL IMAGERY FOR APPLICATIONS IN HYDROLOGY AND OCEANOGRAPHY
J. M. Monget *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 151-153 Original contains color illustrations (For availability see N75-14216 05-43)

Work was carried out aimed largely at finding the combination of false colors best suited to the monitoring of suspended matter and chlorophyll patterns. The best results were obtained off the coast of Italy, where evidence of water pollution by oil slicks was also clearly detected. On the North Sea coast, the turbid nearshore surface water distribution has been greatly enhanced, allowing good mapping of sediment transport in this area. The color composites also contain useful information regarding in-land hydrology. For example, the difference between humid and dry vegetation is clearly visible all along the North Sea coast, so that an accurate outline of the polders can be obtained.
Author (ESRO)

N75-14232 Zurich Univ. (Switzerland).
METHODOLOGICAL ASPECTS AND REGIONAL EXAMPLES OF SNOW-COVER MAPPING FROM ERTS-1 AND EREP IMAGERY OF THE SWISS ALPS
H. Haefner (Swiss Federal Inst. of Technol.) and K. Seidel *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 155-164 refs Original contains color illustrations (For availability see N75-14216 05-43)

A quick-look method of mapping snow cover and measuring the areal extent of its surface was developed, allowing rapid interpretation of each image. The method combines the advantages of an automatic photo-quantier with high-resolution photographic techniques for a rapid determination of the variation in the snow cover and its boundaries. The method is demonstrated for a test area of about 170 sq km in the southeastern Swiss Alps and with vertical differences of about 2000 m. The results are combined and compared with ground information. The method could also be applied to data from a source other than ERTS.
Author (ESRO)

N75-14233 Norwegian Water Resources and Electricity Board, Oslo.
ERTS-1 IMAGES IN GLACIOLOGY AND HYDROLOGY: NORWEGIAN EXPERIENCE
G. Ostrem *In* ESRO European Earth-Resources Satellite Expts. [May 1974] (date) p 165-172 Original contains color illustrations (For availability see N75-14216 05-43)

In order to determine glaciological mass balance, use was made of aerial photographs and ERTS images. By projecting enlarged ERTS images onto topographic maps, the height of the transient snow line can be determined (particularly from MSS 6 and 7) and a good estimate can be obtained of the glacier mass balance over large areas. Both color-composite techniques and image enhancement with contour film have been tried. Experiments with photographic density slicing of ERTS images have shown that the areal extent of snow cover can be delineated and areas of very thick snow (with the highest reflectance) can be separated from thin (or wet) snow. Heavily sediment-loaded glacier streams can be distinguished from less sediment-loaded waters with a similar technique. A cost/benefit estimate is presented.
Author (ESRO)

N75-14234 Deutsches Hydrographisches Institut, Hamburg (West Germany).
USE OF ERTS-1 IN SEA-ICE STUDIES
K. Struebing *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 173-178 refs (For availability see N75-14216 05-43)

Arctic and subarctic regions are presented to demonstrate the specific characteristics and advantages of ERTS-1 data. The 60-100 m resolution of the images allows very detailed and precise interpretation and mapping of even the smaller sea ice features. Making use of the differences in reflectance in the visible and near-IR bands, different ice types and development stages can be distinguished. Furthermore, a special relationship between the ice cover and its regional occurrence as shown by ERTS images is emphasized.
Author (ESRO)

N75-14235 Hunting Surveys, Ltd., Boreham Wood (England).
NATURAL-RESOURCES MAPPING OF ETHIOPIA FROM ERTS-1 IMAGERY
L. P. White *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 179-184 Original contains color illustrations (For availability see N75-14216 05-43)

The complete ERTS coverage of Ethiopia was used to examine its potential for mapping a variety of natural resources including soils and landforms, vegetation, and land use. The high planimetric accuracy of the imagery has proved invaluable in map compilation and in a number of cases major discrepancies were found in geographical detail between the imagery and the 1,000,000 base maps used for reference. The study confirms the experience of many investigators that the ERTS imagery can be used for a range of natural resources mapping to reconnaissance level, but the supplementary ground information necessary varies considerably for each application. As well as the basic resource mapping capability, the sequential cover allows monitoring of dynamic situations, even of very subtle expression.
Author (ESRO)

N75-14236* Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.
CONTRIBUTION OF SPACE PLATFORMS TO A GROUND AND AIRBORNE REMOTE-SENSING PROGRAMME OVER ACTIVE ITALIAN VOLCANOES
R. Cassinis, G. M. Lechi, and A. M. Tonelli *In* ESRO European Earth-Resources Satellite Expts. May 1974 p 185-197 Sponsored by NASA (For availability see N75-14216 05-43)

ERTS-1 imagery of the volcanic areas of southern Italy was used primarily for the evaluation of space platform capabilties in the domains of regional geology, soil and rock-type classification and, more generally, to study the environment of active volcanoes. The test sites were selected and equipped primarily to monitor thermal emission, but ground truth data was also collected in other domains (reflectance of rocks, soils and vegetation). The test areas were overflown with a two channel thermal scanner, while a thermo camera was used on the ground to monitor the hot spots. The primary goal of this survey was to plot the changes in thermal emission with time in the framework of a research program for the surveillance of active volcanoes. However, another task was an evaluation of emissivity changes by comparing the outputs of the two thermal channels. These results were compared with the reflectance changes observed on multispectral ERTS-1 imagery.
Author (ESRO)

N75-14237 Milan Univ. (Italy). Inst. of Mineralogy.
GEOLOGICAL FEATURES ON ERTS-1 IMAGES OF A TEST AREA IN THE WEST-CENTRAL ALPS
A. Boriani, C. M. Marino, and R. Sacchi (Turin Univ.) *In* ESRO European Earth Resources Satellite Expts. May 1974 p 199-204 refs (For availability see N75-14216 05-43)

A geologic approach was made to the definition of the capability of ERTS-1 to enhance the main geologic characteristics of some typical areas of the Alps. The area examined in the first stage of this research is in the west-central Alps region around some of the main Italian lakes (Orta, Maggiore, Como). A certain number of geologic lineaments were enhanced. Their comparison with previous geologic data shows a very interesting peculiarity: almost all the lineaments discovered are vertical faults. In order to evaluate the findings properly, many ground surveys were performed along the observed lineaments. Some of the most interesting discoveries concern the well-known Insubric Line. Some conclusions can be drawn regarding the ability of ERTS-1 type satellites to assist tectonic or general geologic studies in areas which in the past have only been studied in great detail in a traditional way.
Author (ESRO)

N75-14238 Zentralstelle fuer Geo-Photogrammetrie und Fernerkundung, Munich (West Germany).
GEOLOGIC EVALUATION OF CENTRAL ITALY FROM ERTS-1 AND SKYLAB DATA
J. Bodechtel, J. Nithack, and R. Haydn *In* ESRO European Earth Resources Satellite Expts. May 1974 p 205-215 refs (For availability see N75-14216 05-43)

Utilizing ERTS-1 and Skylab imagery, linear features of the Apennines were enhanced by conventional photogeologic methods and by optical processing techniques using a coherent light source. Horizontal and vertical faults of regional dimensions could be detected. On the basis of fieldwork and aerial photointerpretation, the lineations revealed by ERTS data could be interpreted as ac, bc and shearing faults of an older rectangular system, and of a younger system. A difference in the direction of the b-axis is explained as caused by a clockwise rotation of larger blocks, whereas the causal main stress remained stable in a southwest-northeast direction. Overthrusts in the Umbrian Apennines and the triangular shape of the Po Valley are explained by the clockwise rotation. The transform faults bordering the blocks of the Northern Appennies, the Tuscan-Umbrian Apennines and the Abruzzi Mountains could be shearing faults due to this main stress.
Author (ESRO)

N75-14239 Technische Universitaet, Clausthal-Zellerfeld (West Germany).
ERTS-1 DATA ON AFAR TECTONICS
P. Kronberg, M. Schoenfeld, R. Guenther, P. Tsombos, and D. Bannert (Federal Inst. for Earth Res., Hanover) *In* ESRO European Earth Resources Satellite Expts. May 1974 p 217-229 refs Original contains color illustrations (For availability see N75-14216 05-43)
(Grant WRK-213)

The Afar Triangle (Ethiopia), where the rift systems of the Red Sea and Gulf of Aden seem to meet, was one of the key areas for recent investigations of crustal-spreading problems. The evaluation of ERTS images led to the first detailed structural mapcovering the whole of the Afar and the adjacent areas. A lithological map was also compiled from ERTS data, covering the Afar and its surrounding areas. Correlations of ERTS data with data from photogeological mapping and from geological, petrological, and geophysical field observations were made. The evaluation of the ERTS-1 images has highlighted new aspects of the tectonics of the Afar and its geological history.
Author (ESRO)

N75-14240 Bureau de Recherches Geologiques et Minieres, Orleans (France).
ERTS IMAGE CONTRIBUTION TO GEOLOGICAL KNOWLEDGE COVERING DIFFERENT TYPES OF CLIMATES (FRANCE, TOGO, DAHOMEY, MADAGASCAR) [CONTRIBUTION DES IMAGES ERTS A LA CONNAISSANCE GEOLOGIQUE SOUS DIFFERENTS TYPES DE CLIMATS (FRANCE, TOGO, DAHOMEY, MADAGASCAR)]
M. Koch, J. Y. Scanvic, and G. Weecksteen *In* ESRO European Earth Resources Satellite Expts. May 1974 p 231-241 In FRENCH; ENGLISH summary (For availability see N75-14216 05-43)

Possibilities of using ERTS images of several climatological areas were enabled by the choice of three test areas, situated in temperate, tropical and subdesert regions, respectively, with or without a laterite cover. Whereas the subdesert climate favored the observation of outcrop formations and hence facilitated its interpretation, as was expected, a large number of indirect criteria highlight structural elements or some lithological units in temperature region.
Author (ESRO)

N75-14241 London Univ. (England). Bedford Coll.
RECOGNITION AND INTERPRETATION OF SPECTRAL SIGNATURES OF VEGETATION FROM AIRCRAFT AND SATELLITE IMAGERY IN WESTERN QUEENSLAND, AUSTRALIA
Monica M. Cole, E. S. Owen-Jones, N. D. E. Custance, and T. E. Beaumont *In* ESRO European Earth Resources Satellite Expts. May 1974 p 243-287 refs Original contains color illustrations (For availability see N75-14216 05-43)

The spectral signatures of vegetation communities recognized on multispectral photography, at scales of 1:15,000 and 1:5000, in the Mary Kathleen-Cloncurry and Dugald River areas of Australia were evaluated with reference of specific environmental parameters, notably bedrock mineralization, and were compared with those detectable on the ERTS-1 satellite imagery. Overlays of the spectral signature units including those subjected to enhancement techniques were prepared and computer output histograms of the geochemical and biogeochemical data generated. The distribution of vegetation associations, soil and rock types along each transect was classified by an unsupervised learning type of analysis using a hierarchical fusion-cluster method. Each individual sample along the transect was specified by its reflectance on the eight spectral bands provided by the photographic imagery and clustering was applied in both the images and measurement space. The results of both methods were compared, when it was found that a hybrid method gave the best results.
Author (ESRO)

N75-14242 Louvain Univ. (Belgium). Inst. of Earth-Sciences.
PRELIMINARY EVALUATION OF ERTS-1 IMAGERY OF CENTRAL AFRICA
J. Sterckx and J. DePloey *In* ESRO European Earth Resources Satellite Expts. May 1974 p 289-295 refs (For availability see N75-14216 05-43)

The investigation was conducted using black and white ERTS-1 imagery, both transparencies and contact paper prints. The Mweru Wantipa swamp, situated between Lake Tanganyika and Lake Mweru, appears on the ERTS imagery as an important lake, bordered on all sides by fault scarps. Only a few features of human presence could be recognized. The parallelism of the rivers on the Kwango plateau is disturbed by a system of grabens, north of Feshi. These are not marked on the geological map. Remains of a forest on the divides permit an evaluation of human density. A large area around the Itimbiri-Zaire confluence was examined on the ERTS imagery in order to propose a geographical division based on the coincidence and possible relationships of particular physical and human features.
Author (ESRO)

N75-14243 Louvain Univ. (Belgium).
PEDOLOGICAL INTERPRETATION OF ERTS-1 IMAGERY OF THE RIMA-SOKOTO RIVER BASIN (N. NIGERIA)
R. Gombeer and J. dHoore *In* ESRO European Earth Resources Satellite Expts. May 1974 p 297-301 refs (For availability see N75-14216 05-43)

Ground truth data were compared with two adjacent ERTS-1 MSS scenes, covering an area roughly located between 4 deg and 7 deg E and 12 deg and 13 deg 30 min N. These 100% cloudless scenes were recorded one month after the monthly rainfall had dropped sharply. Some variation in plant available ground water and in plant cover could therefore be expected and the reflections of the vegetation, together with those characteristic of soil surfaces under different physical conditions, should give rise to recognizable features. By projection of positive transparencies, meaningful enlargements up to a scale of 1:1000,000 could be obtained. MSS bands 5, 6 and 7 in particularly yielded good pictures of drainage patterns and other geomorphologic features, and excellent correlation was observed with the 1:5000,000 scale geomorphological map of the area by Sombroek and Zonneveld.
Author (ESRO)

N75-14244 Institut Geographique National, Paris (France).
COMPARISON OF VARIOUS NUMERICAL TECHNIQUES FOR CLASSIFICATION OF MULTISPECTRAL DATA. APPLICATION TO GEOLOGY [COMPARAISON DE DIFFERENTES TECHNIQUES NUMERIQUES SERVANT A LA CLASSIFICATION DES DONNEES MULTISPECTRALES. APPLICATION A LA GEOLOGIE]
F. Brun, A. Fontanel (Inst. Franc. du Petrole, Paris), C. Lallemand (Inst. Franc. du Petrole, Paris), G. Legendre (Inst. Franc. du Petrole, Paris), J. C. Rivereau (Inst. Franc. du Petrole, Paris), and G. Thomas (Inst. Franc. du Petrole, Paris) *In* ESRO European Earth Resources Satellite Expts. May 1974 p 303-316 refs In FRENCH; ENGLISH summary Original contains color illustrations (For availability see N75-14216 05-43)

Numerical computation was used to distinguish and map various terrains, highways, rivers, etc....on ERTS image taken on 6 October 1972 over the Rhone Valley (France). For this purpose three numerical techniques were used: (1) discriminatory analysis (supervised technique) for which it is necessary to define and delineate characteristic zones from which the identification algorithms are calculated: (2) principal component analysis (unsupervised technique) for which the different classes are obtained directly by computation; (3) adaptive analysis technique which is easier to implement than the two preceding techniques: on the one hand only selected zones are automatically mapped

with the computer and on the other hand the delineation of the corresponding test sites (training areas) is not needed. These three techniques were tested on the same area (1500 sq km) and the results compared with vegetation and geological maps.
Author (ESRO)

N75-14245 Strasbourg Univ. (France).
ERTS-1 CONTRIBUTIONS TO THE ECOGENETICAL KNOWLEDGE OF THE LLANOS OF THE ORINOCO (COLOMBIA AND VENEZUELA) [APPORTS DE ERTS-1 A NOTRE CONNAISSANCE ECOGENETIQUE DES LLANOS DE L'ORENOQUE (COLOMBIE ET VENEZUELA)]
J. Tricart *In* ESRO European Earth Resources Satellite Expts. May 1974 p 317-324 refs In FRENCH; ENGLISH summary (For availability see N75-14216 05-43)

Satellite multispectral photographs were used for reconnaissance of the Orinoco Llanos. These photographs, combined with verification on the ground, provide a small-scale overall view which helps to bring out the main features of the ecogenesis. The sandy deposits built up along the rivers up to about 6 deg N were affected by strong wind action, which formed slightly bow-shaped longitudinal dunes lying in a direction between ENE-WSW and NNE-SSW. At the western and southern extremities of the region the dunes form folds on the southern banks of the rivers, invading the edge of sand-clay interfluves formed from older materials. The dunes were partially drowned by Holocene silt-clay material and probably date from the pre-Flandrian regression. Dune plant cover degradation, by cattle during flooding, leads to wind reactivation. Any rational development of this area should take these phenomena into account.
Author (ESRO)

N75-14246 Centre National de la Recherche Scientifique, Toulouse (France). Service de la Carte de la Vegetation.
ARNICA/ERTS-1 EXPERIMENT. RESULTS AND PERSPECTIVES [EXPERIENCE ARNICA/ERTS-1. RESULTATS ET PERSPECTIVES]
P. A. Rey *In* ESRO European Earth Resources Satellite Expts. May 1974 p 325-347 In FRENCH; ENGLISH summary Original contains color illustrations (For availability see N75-14216 05-43)

The ARNICA program, concerned with processing of ERTS imagery covering southwest France and the Pyrenees, is discussed. Three fundamental fields have been treated: analog exploitation of the images, digital exploitation combined with automatic cartography, and ground truth experiments together with a study of atmospheric image transfer.
ESRO

N75-14247 International Inst. for Aerial Survey and Earth Sciences, Enschede (Netherlands).
PRELIMINARY RESULTS OF THE INTERPRETATION OF ERTS-1 IMAGERY FOR SOIL SURVEYS IN THE MERIDA REGION, SPAIN
F. W. Hilwig, D. Goosen, and D. Katsieris *In* ESRO European Earth Resources Satellite Expts. May 1974 p 349-361 refs (For availability see N75-14216 05-43)

The potential of ERTS-1 imagery for soil surveying was evaluated. The imagery was related to the results of an aerial survey training and research project carried out in the Merida region in Spain over the past six years. Both black and white and color imagery was studied using various bands and a number of filter and illumination combinations. Preliminary results seem promising. Major landforms and some subdivisions could be easily recognized. Water bodies, river courses, extensive areas of Miocene clays, and more recent coarse-textured deposits could be delineated and existing soil maps at scales up to 1:100,000 could be updated. ERTS-1 imagery promises to be very valuable for generalized or exploratory surveys at small scales up to 1:500,000, valuable for reconnaissance surveys at scales up to 1:100,000, and useful for surveys at scales up to 1:50,000 in conjunction with conventional aerial photointerpretation.
Author (ESRO)

N75-14248 Centre d'Etudes Phytosociologiques et Ecologiques, Montpellier (France).
QUALITATIVE STUDY OF SOME ERTS-1 IMAGES OF THE GOLION PROJECT. ECOLOGICAL ASPECTS OF TERRESTRIAL ENVIRONMENTS [ETUDE QUALITATIVE DE QUELQUES IMAGES ERTS-1 DU PROJET GOLION. ASPECTS ECOLOGIQUES DES MILIEUX TERRESTRES]
G. Caballe, B. Lacaze, and G. Long *In* ESRO European Earth Resources Satellite Expts. May 1974 p 363-370 refs In FRENCH; ENGLISH summary Sponsored jointly by CNES and Direc. des Rech. et Moyens d'Essais (For availability see N75-14216 05-43)

The main results of an initial study of the ERTS-1 imagery (MSS, 4 channels) of the GOLION Project southern (France) are presented. The aim is to demonstrate that, from an objective analysis of the images on a scale of 1:1,000,000 studied channel-by-channel or by comparison, it is possible to discern homogeneous or isophenic zones which contribute to global thematic data (chiefly geomorphology, vegetation and land use). Over a test area of 1200 sq km, 24 zones were determined on the basis of the image criteria and their variations. The conclusions from this qualitative approach will serve as basic assumptions for a quantitative multispectral study using digital data. Because of the erratic nature of the images received, it was not possible to make an effective time-sequence study. The value of ecographic satellite images for the definition of ecological regions is commented upon.
Author (ESRO)

N75-14249 Overseas Development Administration, Surrey (England). Land Resources Div.
A COMPARISON OF ERTS IMAGERY WITH CONVENTIONAL AERIAL PHOTOGRAPHY FOR LAND-RESOURCE SURVEYS IN LESS DEVELOPED COUNTRIES. EXAMPLES FROM THE RIFT VALLEY LAKES BASIN, ETHIOPIA
R. B. King and A. BlairRains *In* ESRO European Earth Resources Satellite Expts. May 1974 p 371-379 refs (For availability see N75-14216 05-43)

The extent to which ERTS imagery can aid land resource surveys in less developed countries was analyzed, with particular regard to: (1) multiband imagery; (2) recent and repetitive imagery; (3) mapping; (4) relief estimation; (5) detail; (6) synoptic viewing; and (7) color composites. These aspects are compared with the data revealed by panchromatic aerial photography. The analysis was carried out within the framework of a conventional land resource survey on a limited budget, and examples are mainly taken from one such survey within the Rift Valley Lakes Basin, Ethiopia. The main conclusions are the ERTS imagery is a significant aid to map production in areas where the present map coverage is poor, but its scale is too small for any detailed analysis. The synoptic aspect of ERTS imagery, however, is useful, particularly as a false-color composite. The ability to monitor changes in hydrology and agriculture is also advantageous.
Author (ESRO)

N75-14250 Reading Univ. (England). Dept. of Geography.
A COMPARISON OF THE CAPABILITIES OF ERTS-1 AND THE SKYLARK EARTH-RESOURCES ROCKET FOR RESOURCES SURVEYING IN CENTRAL ARGENTINA
J. R. G. Townshend, R. A. G. Savigear, C. O. Justice, J. R. Hardy, D. S. H. Drennan, and C. J. Bray *In* ESRO European Earth Resources Satellite Expts. May 1974 p 381-403 refs Orginal contains color illustrations (For availability see N75-14216 05-43)
(Contract AT/2035/025)

An evaluation of the potential of photographs from the earth-resources Skylark rocket was made in a joint Anglo-Argentinian project. Part of this program consists of a resources evaluation, and comparisons were made with imagery of the same area obtained from ERTS-1. These two space platform resource systems have several differences which affect their utility for different resource-evaluation tasks. With high resolution emulsion and long focal length cameras, the resolution of the Skylark photography is significantly better than that of ERTS imagery. Comparisons of the two sets of imagery were made for a variety of features.
Author (ESRO)

N75-14251 Bristol Univ. (England).
GROUND-TRUTH MEASUREMENTS IN RELATION TO AIRCRAFT AND SATELLITE STUDIES OF AGRICULTURAL LAND USE AND LAND CLASSIFICATION IN BRITAIN
L. F. Curtis and A. J. Hooper (Min. of Agr., London) *In* ESRO European Earth Resources Satellite Expts. May 1974 p 405-415 refs (For availability see N75-14216 05-43)

Examples are given of ground truth collection in relation to

ERTS-1 and aircraft sensing data for southwest Britain. These demonstrate that the concept of a ground truth site will vary according to the user's objective and the size of the area under study. The range of ground-truth data necessary for evaluation of remote sensing data collection techniques in respect of land-classification and agricultural land use studies are summarized. Estimates of the manpower requirements are given on the basis of two study programs. General problems of ground data collection are considered in respect of timing of observations, crop height, crop roughness, crop color, perspective, soil exposure, agricultural treatments, etc. Specific problems of data recording are discussed in relation to selected crops. Standardization of ground truth recording techniques for agricultural and land classification studies is described. Author (ESRO)

N75-14252 Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.

AGRICULTURAL RESOURCES INVESTIGATIONS IN NORTHERN ITALY, SOUTHERN FRANCE AND MADAGASCAR

R. Cassinis, M. Guyader (Centre d'Etudes Spatiales des Rayonnements, Toulouse), and S. GalliDeParatesi (Joint Res. Centre, Ispra, Italy) *In* ESRO European Earth Resources Satellite Expts. May 1974 p 417-437 Original contains color illustrations (For availability see N75-14216 05-43)

Under a program of collaboration between the Commission of the European Communities and various specialized national institutes, the project is designed to utilize data from ERTS-B and aircraft flights for research into rice growing and forestry. Ground experiments have been concerned mainly with the preparation of bio-climatological measurements and automation of their collection, as well as the methods of recording ground truth. By microdensitometric processing of ERTS-1 images of the Camargue, it was possible to identify rice fields before sowing. Owning a radiometry campaign with lysimeters, a series of aircraft flights with an IR camera, a four-channel radiometer, a two-channel thermal IR scanner, and thermographic surveys, it was possible to obtain details of several problems affecting rice fields in Northern Italy. The preliminary results form a basis for the exploitation of ERTS-B data. Author (ESRO)

N75-14253* National Aeronautics and Space Administration, Washington, D.C.

FUTURE US ACTIVITIES BASED ON EXPERIENCE GAINED FROM ERTS-1 AND EREP

G. Thorley *In* ESRO European Earth Resources Satellite Expts. May 1974 p 439-447 (For availability see N75-14216 05-43)

Current and future U.S. activities in the fields of land use, agriculture, forestry, and water resources are summarized. ESRO

N75-14254# CER Geonuclear Corp., Las Vegas, Nev.

RIO BLANCO MASSIVE HYDRAULIC FRACTURE: PROJECT DEFINITION

1973 99 p refs

(PNE-MHF-1) Avail: NTIS HC $4.75

The Piceance Basin in Colorado contains an estimated 600 trillion cu ft of natural gas in place. Both the Rulison and Rio Blanco Events have been detonated to determine the feasibility of nuclear fracturing to stimulate natural gas production in this basin. A demonstration program to test the relative effectiveness of massive hydraulic fracturing (MFH) to achieve natural gas production stimulation from the same gas reservoir is presented. Details are included on: MHF design parameters, including surface and subsurface equipment, pumping requirements, evaluation of fracturing results, and all associated test programs; site characteristics and preparation; proposal for gas utilization program; environmental surveillance and comparative analysis of environmental aspects of MHF and nuclear stimulation; gas delivery estimates; project administration; and costs and scheduling. NSA

N75-14255# Army Foreign Science and Technology Center, Charlottesville, Va.

INVESTIGATION OF ACCURACY OF DETERMINATION OF PLANE COORDINATES BY MEANS OF THE CENTRAL SCIENTIFIC RESEARCH INSTITUTE OF GEODESY, AERIAL PHOTOGRAPHY AND CARTOGRAPHY AIRBORNE RANGE-FINDER

I. L. Gill, K. N. Gertsenova, and B. A. Batamanovskii 19 Nov. 1973 13 p refs Transl. into ENGLISH from Geod. Kartografiya (USSR), no. 3, 1972 p 37-44

(AD-785886; FSTC-HT-23-1270-73) Avail: NTIS CSCL 08/5

To answer the question of the possibility of using an airborne range finder (ARR) in topographic surveys on a 1:10,000 scale, and to choose the optimum technology of operations, experimental investigations were carried out on the accuracy of creating a radio-geodetic plane base by a method using the ARR. GRA

N75-14256# Royal Coll. of Art, London (England). Experimental Cartography Unit.

CARTOGRAPHIC PERFORMANCE: AN EVALUATION OF ORTHOPHOTOMAPS Final Technical Report, Sep. 1970 - Mar. 1974

Adrian R. Hill Mar. 1974 236 p refs

(Contract DAJA37-70-C-3298; DA Proj. 2M0-61102-B-52B) (AD-783519) Avail: NTIS CSCL 08/2

The report describes a series of behavioral studies, using British Army personnel, on a number of different orthophotomap products. User performance with six graphic forms of orthophotomaps each surprinted with two levels of annotation was examined in three environmental settings. This included performance under high and low levels of illumination in the map-room, and day-time performance in the field. The performance tasks concentrated on the user's ability to detect, identify and recognize various features depicted on the map; including object identification, height estimation and terrain visualization for the map-room studies, and direction orientation, self location and map/field intercorrelations in the field study. (Modified author abstract) GRA

N75-14257# Army Foreign Science and Technology Center, Charlottesville, Va.

WORK DEALING WITH DENSIFICATION OF ALTIMETRIC-PLANOMETRIC DATA POINTS EMPLOYING UNIVERSAL INSTRUMENTS AND RADIO ALTIMETER AND STATOSCOPIC INDICATIONS

N. L. Borodin 25 Jul. 1974 13 p Transl. into ENGLISH from Geodez. i Kartograf. (Moscow), no. 11, 1969 p 46-52

(AD-785877; FSTC-HT-23-780-72) Avail: NTIS CSCL 08/2

Experimental work is reported on the photogrammetric densification of altimetric-planometric data. The photography studied was on a scale of 1:10,000 with a relief profile of 2.5 meters. The construction of photogrammetric grids, the geodetic orientation, and grid linking are discussed. Evaluation results of the study are tabulated. F.O.S.

N75-14258# Army Foreign Science and Technology Center, Charlottesville, Va.

MORPHOGRAPHIC AND MORPHOMETRIC ANALYSIS OF VEGETATIVE COVER PHOTOGRAPHS IN AERIAL PHOTOGRAPHY FOR THE MAPPING OF VEGETATION

B. V. Vinogradov 1 Nov. 1973 11 p refs Transl. into ENGLISH from the book "Krupnomasshtabnoe Kartografirovanie Rastitelnosti" Novosibirsk, Nauka, 1970 p 96-101

(AD-785932; FSTC-HT-23-1296-73) Avail: NTIS CSCL 08/2

Countour boundaries and transition areas provide the greatest amount of information to the eye in the interpretation of photo images; this principle can be applied to the mapping of vegetation by aerial photography. The article discusses a variety of morphographic landform classifications, their relation to geobotanical interpretation, and means and methods for gathering and processing statistical information from aerial photographs. The value of statistical methods in simplifying field work is stressed. GRA

N75-14259# Army Foreign Science and Technology Center, Charlottesville, Va.

SCIENTIFIC RESEARCH AND EXPERIMENTAL DESIGN PLANNING AND COORDINATION FOR 1973

A. E. Sitalov 15 Apr. 1974 7 p Transl. into ENGLISH from Geodez. i Kartograf. (Moscow), no. 2, Feb. 1973 p 72-74

(AD-785998; FSTC-HT-23-0158-74) Avail: NTIS CSCL 08B

The report gives the results of a meeting discussing coordination of plans and projects in geodesy, aerial photography and cartography. New techniques, instruments and cooperation are introduced for 1973 to increase the efficiency of work done

by the geodetic service. The topographical, geodetic and cartographic services are now part of the Scientific and Technical Mining Society. GRA

N75-14260# Montana State Univ., Bozeman. Water Resources Research Center.
WATER RESOURCE AND HAZARD PLANNING REPORT FOR THE CLARK FORK RIVER VALLEY ABOVE MISSOULA, MISSOULA COUNTY, MONTANA
Robert J. Wheeler Jul. 1974 78 p refs Sponsored in part by Dept. of Agriculture
(Contract DI-14-31-0001-3826)
(PB-236041/0; MUJWRRC-51;OWRR-A-065-MONT(1)) Avail: NTIS HC $4.75 CSCL 08H

A 33-mile reach of the Clark Fork River east of Missoula, Montana, was the subject of a two-year hydrology and flood hazard study. The 100-year flood plain was delineated by a unique method incorporating aerial photographs obtained during a flood of known recurrence interval, and synthesized rating curves developed for several sites in the reach. The maps, which were developed at a cost of $120 per river mile, are believed to be nearly as accurate as maps obtained by more sophisticated and costly techniques. Water levels in 20 wells were monitored during a one-year period to determine piezometric surfaces and water table fluctuations. Gravity traverses were made to determine bedrock configurations and depths to bedrock. GRA

N75-14261# Environmental Research Inst. of Michigan, Ann Arbor.
THE REMOTE IDENTIFICATION OF TERRAIN FEATURES AND MATERIALS AT A CALIFORNIA TEST SITE: AN INVESTIGATIVE STUDY OF TECHNIQUES Interim Report, Sep. 1972 - Dec. 1973
R. K. Vincent, R. D. Dillman, and P. G. Hasell, Jr. Apr. 1974 64 p refs
(Contract FH-11-7136)
(PB-235991/7; ERIM-196200-11-T; FHWA-RD-74-27) Avail: NTIS HC $4.25 CSCL 08M

The collection, processing, and analysis of multispectral imagery gathered in airborne mapping of a site in the vicinity of Halloran Springs, California in the fall of 1972 are discussed. The general purpose is to develop techniques for automatically identifying selected terrain features and natural materials in remotely sensed imagery. Objectives were to automatically classify both soils of different textures or parent materials and rock outcrops based on (1) their spectral reflectance characteristics at ultraviolet, visible, and infrared wavelengths, and (2) their emissivity differences as noted in multiple thermal bands. The first objective was achieved; the second was not, primarily because of the poor performance of an experimental multiband thermal-wavelength detector. GRA

N75-14262# Washington Univ., Seattle. Arctic Ice Dynamics Joint Experiment Office.
AIDJEX BULLETIN NUMBER 25
Jul. 1974 126 p refs
(Contract NSF C-625)
(PB-235298/7; AIDJEX-74-25) Avail: NTIS HC $5.75

A variety of articles dealing with field work and data analysis as well as pack ice modeling is presented. Articles discuss: suitability of the pack ice surface to vehicle travel; thickness and roughness variations of multiyear sea ice; determining dynamics and morphology of Beaufort Sea ice from data obtained by satellites, aircraft, and drifting stations; a climate simulation model applied to arctic pack ice; and problems of structuring large capacity computer programs. An index to all ERTS-1 photographs that are presently in the AIDJEX data bank is included. GRA

N75-14263# Environmental Research Inst. of Michigan, Ann Arbor.
THE REMOTE IDENTIFICATION OF TERRAIN FEATURES AND MATERIALS AT PENNSYLVANIA TEST SITES: AN INVESTIGATIVE STUDY OF TECHNIQUES Interim Report, Apr. 1969 - Dec. 1972
Franklin G. Sadowski, Thomas W. Wagner, Philip G. Hasell, Jr., and Frederick J. Thomson Mar. 1974 93 p refs
(Contract FH-11-7136)
(PB-235992/5; ERIM-196200-5-T; FHWA-RD-74-9) Avail: NTIS HC $4.75 CSCL 08M

The collection, processing, and analysis of multispectral imagery gathered in airborne mapping is reported. The specific objective was to automatically classify soils of different parent materials by surface spectral reflectance and emittance characteristics. Processing techniques included multispectral statistical pattern recognition, ratio processing, and single channel processing. Analog and digital procedures were utilized. The discrimination of bare soils was accomplished, but classification of soils according to parent material yielded unpromising results. An average spectral difference was noted between limestone-derived soils and sandstone- and shale-derived soils in the 11 channel visible and near-IR spectral region. An apparent capability to improve the classification of soils despite albedo variation was demonstrated by using the ratio of five channels from the same region. Scan-angle variations indicated sufficient differences in the bidirectional reflectance characteristics to warrent correction of the data prior to processing. (Modified author abstract) GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N75-14264# Mitre Corp., Washington, D.C.
JAPANESE/UNITED STATES SYMPOSIUM ON SOLAR ENERGY SYSTEMS. VOLUME 1: SUMMARY OF PROCEEDINGS
Jun. 1974 53 p Held in Washington, D. C., 3-5 Jun. 1974 Sponsored by RANN
(Grant NSF GI-44066)
(MTR-6284-Vol-1) Avail: NTIS HC $4.25

Technical papers reviewing the present status and future plans for the development of solar energy systems in Japan and the United States are presented. In addition, data are given on the following: (1) solar-thermal systems for heating and cooling of buildings, heating of water, process heat, solar furnaces, and generation of electricity, (2) ocean based systems for generation of electricity, (3) photovoltaic systems for direct generation of electricity, (4) thermoelectric and thermionic systems for the direct generation of electricity, (5) wind energy conversion systems for the generation of electricity or the pumping of water, air, or other fluids, (6) organic material systems for the production of energy crops on land or in the oceans, and bioconversion processes for manufacturing heat, electricity, etc. and (7) chemical dissociation systems for the production of hydrogen and oxygen gases and electricity. Author

N75-14265# Committee on Science and Astronautics (U. S. House).
CONSERVATION AND EFFICIENT USE OF ENERGY
Olin E. Teague Washington GPO 1974 281 p refs Rept. of the Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., 18 Dec. 1974
(H-Rept-93-1634; GPO-38-968) Avail: SOD HC $2.60

The potential for energy conservation in the United States of America is assesed and the actions taken by the Federal agencies to achieve this goal are reviewed. Many economic, social, and technical issues relevant to the critical energy problem are elaborated. G.G.

N75-14266*# Grumman Aerospace Corp., Bethpage, N.Y.
THE 100 AMPERE-HOUR NICKEL CADMIUM BATTERY DEVELOPMENT PROGRAM, VOLUME 1 Final Report
S. Gaston Mar. 1974 384 p 2 Vol.
(Contract NAS9-11074)
(NASA-CR-140380) Avail: NTIS HC $10.25 CSCL 10C

A program to develop a long-life, reliable and safe 100 ampere-hour sealed nickel-cadmium cell and battery module with ancillary charge control and automated test equipment to fulfill the requirements of a large Manned Orbital Space Station which uses Solar Arrays as its prime source for 25 kW of electrical power was conducted. A sealed 100 ampere-hour cell with long life potential and a replaceable, space maintainable battery module has been developed for Manned Space Station applications. The 100 ampere-hour cell has been characterized for initial (early life) anticipated conditions. Author

N75-14267 *# Grumman Aerospace Corp., Bethpage, N.Y.
THE 100 AMPERE-HOUR NICKEL CADMIUM BATTERY DEVELOPMENT PROGRAM, VOLUME 2 Final Report
S. Gaston Mar. 1974 361 p refs 2 Vol.
(Contract NAS9-11074)
(NASA-CR-140381) Avail: NTIS HC $10.00 CSCL 10C
For abstract, see N75-14266.

N75-14268# Sandia Labs., Albuquerque, N.Mex.
AXIAL TEMPERATURE DIFFERENTIAL ANALYSIS OF LINEAR FOCUSED COLLECTORS FOR SOLAR POWER
D. O. Lee and W. P. Schimmel, Jr. 1974 7 p refs Presented at the 9th Intersoc. Energy Conversion Eng. Conf., San Francisco, 26 Aug. 1974 Sponsored by AEC
(SLA-74-5078; Conf-740805-3) Avail: NTIS HC $3.25

Solar energy collection over a moderate temperature range was studied, with Therminol 66 used as the collector fluid. Convective and radiative transport between the reciever and envelope, and from the envelope to the environment are modeled. Results are presented for (1) varying values of specular solar input for Albuquerque, New Mexico, on a statistical June 21, (2) fluid flow rate, (3) initial fluid temperature for both silvered and unsilvered envelopes, and (4) both evacuated and unevacuated envelopes. The best extraction of energy and the best temperature rise in the fluid is found to occur in the turbulent flow regime of the collector fluid. The maximum for any given flow rate with a given inlet temperature is shown to occur just after transition from laminar to turbulent flow. Author (NSA)

N75-14269# Teledyne Isotopes, Timonium, Md. Energy Systems Div.
ECONOMIC RADIOISOTOPE THERMOELECTRIC GENERATOR STUDY PROGRAM Final Technical Report
Oct. 1973 216 p
(Contract SNSO-3)
(IESD-3112-1) Avail: NTIS HC $7.25

Radioisotope thermoelectric generator concepts are evaluated and a reference design is selected which would provide a safe, reliable, economic 400 W(e) power supply for use in future space communication satellites. Nine basic concepts and 18 additional trade-off configurations were evaluated during the study program. The reference design ERTG is a generator with 400 W(e) EOM(5.5y) output, 15 standard heat source blocks, an improved all selenide thermopile, and two heat pipe augmented fins for waste heat rejection. The generator uses cm-244 as fuel but will accept pu-238. NSA

N75-14270# Teledyne Isotopes, Timonium, Md. Energy Systems Div.
ECONOMIC RADIOISOTOPE THERMOELECTRIC GENERATOR STUDY PROGRAM: APPENDICES. Final Technical Report
Oct. 1973 350 p refs
(Contract SNSO-3)
(IESD-3112-2) Avail: NTIS HC $9.50

This report consists of 14 appendices to the economic radioisotope thermoelectric generator (ERTG) study program described in IESD-3112-1. The appendices are entitled: Concept Summary Sheets; Low Temperature Heat Pipe Technology; Selenide T/E Technology and Test Data; Improved TAGS/2N T/E Technology; Bimetallic Seal Technology; Cold End Hardware Technology; Thermal Insulation Technology; Thermal Control Technology; Nuclear Safety Criteria; Heat Source Selection and Compatibility; Heat Source Response Analysis; Search and Recovery; Shield Analysis-Methods and Models; and Heat Pipe Attachment Techniques. NSA

N75-14271# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.
THE MODULAR SOLAR ENERGY SATELLITE: INVESTIGATION ON LARGE SOLAR CELL SURFACES IN SPACE FOR THE PURPOSE OF EARTH POWER SUPPLY [DER MODULARE SONNEN-ENERGIE-SATELLITE. UNTERSUCHUNGEN AN GROSSEN SOLARZELLENFLAECHEN IM WELTRAUM ZUM ZWECK DER ENERGIEVERSORGUNG DER ERDE]
Jan Ruth May 1974 87 p refs In GERMAN; ENGLISH summary
(ILR-17-1974) Avail: NTIS HC $4.75

Increased feasibility of solar energy satellite is obtained by a modular honeycomb-like structure of solar collectors. Suggestions are given with regard to satellite control problems. Electrical propulsion was adopted to take care of orbit perturbations. ESRO

N75-14272# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany).
DEVELOPMENT OF A FLEXIBLE SOLAR-CELL-ARRAY PANEL (ROSA E1)
P. Kleber and E. G. Suppa Paris ESRO Jul. 1974 136 p
(Contract ESTEC-113/70-AA)
(ESRO-CR-98) Avail: NTIS HC $5.75

The main development and manufacturing efforts to increase solar cell life by implementing a blanket repair technique are described. The blanket performance was increased by using kapton/glass fiber laminate substrate. A suitable cell-to sub-strate adhesive was selected. Array manufacturing was optimized by using Ag-mesh as cell interconnector and electrical wiring component. The subpanel units were standardized in order to simplify manufacturing and handling procedures. A demonstration of blanket repairability by replacing groups and/or single cells was given. The viability of the array design was demonstrated experimentally during an extensive environmental test program. ESRO

N75-14273# National Academy of Engineering, Washington, D.C.
EVALUATION OF COAL-GASSIFICATION TECHNOLOGY. PART 2: LOW AND INTERMEDIATE BTU FUEL GASES Interim Report, Jan. - Dec. 1973
Mar. 1974 103 p refs
(Contract DI-14-32-0001-1216)
(PB-234042/0; OCR-74-INT-2) Avail: NTIS; SOD HC $1.10 as I63.10:74/INT2 CSCL 07A

Production of low and medium BTU from coal is discussed. Various gasification, desulfurization, and purification procedures are presented, as well as cost estimates, and alternative means of clean fuel production. GRA

N75-14274# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
EVALUATION OF AN ION EXCHANGE MEMBRANE FUEL CELL FOR SPACE POWER Final Report, Oct. 1969 - Jan. 1974
Irvin F. Luke May 1974 22 p
(AF Proj. 3145)
(AD-786888; AFAPL-TR-74-27) Avail: NTIS CSCL 10/2

An experimental electrolysis cell using an ion exchange membrane (solid polymer electrolyte) achieved 29,120 hours of endurance testing prior to failure. The cell was tested under a repetitive cycle of 23-hours electrolysis operation and one-hour open circuit. The cell was operated in the electrolysis mode at a constant current density of 128 amperes per square foot (asf) with the average cell temperature maintained at 170F. Disassembly inspection of the cell after the endurance test revealed very little degradation in the electrodes and screens, but considerable decomposition of the water transport wicks. Small cracks in two areas of the membrane accounted for the ultimate failure of the cell. (Modified author abstract) GRA

N75-14275# Army Foreign Science and Technology Center, Charlottesville, Va.
GEOTHERMAL POWER STATION
29 Mar. 1974 7 p Transl. into ENGLISH from Tekhn. Molodezhi (Moscow), no. 1, 1973 p 4-5

(AD-785948; FSTC-HT-23-1674-73) Avail: NTIS CSCL 10/2

The article mentions a geothermal power plant in Kamchatka using 200-300 degrees steam as the power source, at an efficiency of about 10%. It further mentions an extensive geothermal field in Kamchatka, with a water temperature of 80-90C, in which the exhaust steam heats freon, which runs a secondary generator. Creation of an artificial magma chamber with a 100 megaton thermonuclear device is proposed, to supply a geothermal power plant by means of heat pipes. GRA

N75-14276# Army Foreign Science and Technology Center, Charlottesville, Va.

SEMICONDUCTING CHARGE-DISCHARGE DEVICES FOR STORAGE BATTERIES

S. A. Volotkovskii, V. D. Fursov, and E. I. Sidorenko 10 Apr. 1974 11 p Transl. into ENGLISH from Mekhaniz. i Avtomatiz. Proizv. (Moscow), no. 2, 1973 p 14-16

(AD-785970; FSTC-HT-23-1788-73) Avail: NTIS CSCL 10/3

Discussed are storage battery semiconducting charge-discharge devices with three-phased bridge rectification for use on mine locomotives. Principle schematic is given, plus schematic design for an automatic current stabilization circuit. Graph shows charge characteristics of typical storage batteries under tests in coal mines. GRA

N75-14277# Colorado State Univ., Fort Collins. Environmental Resources Center.

PRIMARY DATA ON ECONOMIC ACTIVITY AND WATER USE IN PROTOTYPE OIL SHALE DEVELOPMENT AREAS OF COLORADO: AN INITIAL INQUIRY

S. Lee Gray Jun. 1974 12 p refs

(Contract DI-14-01-0001-4006)

(PB-236039/4; OWRR-A-024-COLO(1); W74-12356) Avail: NTIS HC $3.25 CSCL 13B

Potential impacts of oil shale development on the economies of certain Western Slope communities in Colorado are quite large. These impacts will likely exert a substantial pressure on the land and water resource lease of the area in addition to the effects upon community development, regional income, income distribution, and a changing mix of business activity. In order to approach future research on these issues this seed research effort was designed to: (1) promote interaction and interchange of ideas among researchers and members of the affected communities; (2) to identify important areas of research needs in the oil shale region; and (3) to initialize the collection of primary data depicting the economic structure of the oil shale communities. GRA

N75-14278# Stanford Research Inst., Menlo Park, Calif.

CONTINUED DEVELOPMENT OF ENERGY TRANSMISSION AND CONVERSION SYSTEMS Annual Report, Jul. 1973 - Jul. 1974

P. M. Newgard, J. R. Woodbury, and J. Eckerle Aug. 1974 104 p

(Contract N01-HT-2907)

(PB-236181/4; NIH/NHLI-N01-HT-4-2907-1) Avail: NTIS HC $5.25 CSCL 10A

The report covers research directed toward the development and application of a technique for transfer of electrical energy into the human body in sufficient quantities to operate an implanted artificial heart. Progress was made in reducing the size and weight of components, especially those to be positioned near the heart within the thorax, without loss in overall efficiency. Progress was also made in upgrading the external power system to represent, more nearly, a truly portable system with increased reliablity. New brushless dc motors were designed, constructed, and tested. These provide higher efficiency than previously used motors and include large air gaps to allow operation while fully submerged in lubricants. A new 15 to 1 ratio gear system was developed. Test data are presented showing achieved gear efficiencies of about 97 percent. Author (GRA)

N75-14279# Oklahoma Industrial Development and Park Planning, Oklahoma City.

APPLICATION STUDY OF A NUCLEAR COAL SOLUTION GASIFICATION PROCESS FOR OKLAHOMA COAL, VOLUME 1

Apr. 1974 339 p refs Prepared by Stone and Webster Eng. Corp. and Gulf General Atomic

(Contract DI-14-32-0001-1219)

(PB-236156/6; GA-A120-68; OCR-86-F) Avail: NTIS MF $2.25; SOD HC $7.50 as I63.10:86 CSCL 07A

This report is presented in two parts, both included in one publication. Volume I contains the results of the Nuclear Coal Solution Gasification Study, descriptions of the coal gasification process and the nuclear reactor heat source, and the conclusions and recommendations formulated on the basis of the study. Volume II consists of the process sketches and equipment lists for the process steps and off sites plus a listing of the literature sources used in the study. This study (1) analyzes the potential increase in marketability and utility of coal reserves in Oklahoma by converting part of them to a higher-quality product and (2) provides the State of Oklahoma with information that will permit the State to analyze the possible benefits from the construction and operation of a coal gasification plant in eastern Oklahoma. Author (GRA)

N75-14280# Martin Marietta Corp., Denver, Colo.

SOLAR POWER SYSTEM AND COMPONENT RESEARCH PROGRAM Semiannual Progress Report, 15 Jan. - 15 Jul. 1973

Floyd A. Blake and Jesse D. Walton 31 Jul. 1974 240 p refs

(Grant NSF GI-41305)

(PB-236159/0; MCR-74-185; NSF/RANN/SE/GI-41305/PR/74/2; NSF/RA/N-74-0-81; SAPR-1) Avail: NTIS HC $7.50 CSCL 10B

System analysis and component design for a 100-MWe solar energy conversion power system are discussed. Report covers user application analyses; meteorological analysis; economic analysis; boiler and superheater component research; and boiler design, bench model design, and test plan. Author (GRA)

N75-14281# Boston Univ., Mass. Dept. of Chemistry.

PHOTOCHEMICAL CONVERSION OF SOLAR ENERGY Semiannual Report, 1 Jan. - 30 Jun. 1974

Norman N. Lichtin 30 Jul. 1974 30 p refs

(Grant NSF GI-38103)

(PB-236266/3; NSF/RA/N-74-087) Avail: NTIS HC $3.75 CSCL 10A

Measurements were carried out to make possible correcting for photo-bleaching effects in the evaluation of quantum efficiencies for conversion of absorbed light into electrical power in an aqueous iron-thionine photogalvanic cell employing an illuminated and a dark electrode. The quantum efficiency of generation of charge carriers was measured. Thin layer totally-illuminated cells with one SnO2 and one Pt electrode were constructed and their performance evaluated with a range of iron-thionine cell solutions. Cyclic voltammetric study of electrode processes was initiated. A flash photolytic-kinetic spectrophotometric investigation of the kinetics of disproportionation of semithionine in a wide range of aqueous organic solvents demonstrated clean second order kinetics in these solvents. The reaction of triplet thionine with Fe(II) in acidic aqueous solution was investigated. The stoichiometry and kinetics of oxidation of leucothionine by Fe(III) were studied in aqueous DMA solutions. (Modified author abstract) GRA

N75-14282# Boston Univ., Mass. Dept. of Chemistry.

PHOTOCHEMICAL CONVERSION OF SOLAR ENERGY Annual Progress Report, 1 Jun. - 31 Dec.

Norman N. Lichtin 22 Jan. 1974 48 p refs Prepared in cooperation with Esso Res. Eng. Co., Linden, N. J.

(Grant NSF GI-38103)

(PB-235474/4; NSF/RANN/SE/GI-38103/PR/73/4; NSF/RA/N-74-048) Avail: NTIS HC $3.75 CSCL 07E

Iron-thionine photogalvanic cells were studied. Cell configuration, electrode materials, solution composition, light intensity, mode of illumination of electrodes, and overvoltage effects were investigated as they relate to dependence of efficiency of conversion of light flux into electric power. Fundamental aspects of the photochemistry and thermal chemistry of the iron-thionine system are covered. Nonphotochemical experiments examine possible chemical side effects of reagents that might influence cell potential via coordination of iron, elementary reactions that

occur in the illuminated cell, and various aspects of thionine chemistry. GRA

N75-14283# Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
SOLAR THERMAL ELECTRIC POWER SYSTEMS Quarterly Progress Report, 1 Jan. - 30 Apr. 1974
Apr. 1974 177 p refs Prepared in cooperation with Westinghouse Electric Corp., Boulder, Colo.
(Grant NSF GI-37815)
(PB-235475/1; NSF/RANN/SE/GI-37815/PR/74/1; NSF/RA/N-74-045; QPR-1) Avail: NTIS HC $7.00 CSCL 10A

Results of research to identify cost effective solar thermal electric power systems are given. Parametric performance and cost models were developed for concentrating collector, heat transport, and heat storage subsystems. Dynamic programming methods to select optimal subsystems and the solar thermal power systems are discussed. Power systems larger than 3 MW capacity that can be used in electrical networks are considered. GRA

N75-14284# Carnegie-Mellon Univ., Pittsburgh, Pa.
SOLAR SEA POWER Quarterly Progress Report, 1 Feb. - 30 Apr. 1974
Clarence Zener, Robert R. Rothfus, Francis Clay McMichael, Charles Kriebel, and Abrahim Lavi 30 Apr. 1974 89 p refs (Grant NSF GI-39114)
(PB-235469/4; NSF/RANN/SE/GI-39114/PR/74-3; NSF/RA/N-74-043; QPR-3) Avail: NTIS HC $4.75 CSCL 10B

The third quarterly report shows how appropriate grooving of the vertical evaporator tubes will greatly reduce their surface area. These three reports now constitute the conceptual basis for the design of a heat exchange system in which the total heat exchange area is only 7 sq ft/net kW output. An analysis of the mixing problem, including the finite radius of the input pipe, shows that the critical input calculated in the semi-annual report was indeed conservative. An ocean current is therefore not needed to avoid mixing for power outputs up to several hundred megawatts. The general problem of technological assessment, and outline the scope of future work is discussed. Author (GRA)

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N75-14285 NATO Committee on the Challenges of Modern Society.
PROCEEDINGS OF THE FIFTH MEETING OF THE EXPERT PANEL ON AIR POLLUTION MODELING
Aug. 1974 788 p refs Meeting held at Risoe, Denmark, 4-6 Jun. 1974
(Rept-35) Avail: Air Pollution Technical Information Center, Office of Air and Waste Management, Environmental Protection Agency, Research Triangle Park, N. C. 27711

The proceedings of a conference on air pollution analysis through the use of atmospheric and environmental models are presented. Emphasis is placed on the need for improving communications between the designers of air quality models and the users or decision makers in the air quality management process to produce improved results. Other subjects considered are: (1) the development of a common data base for air quality modeling, (2) the validation of air quality simulation models, (3) short term and real time modeling, (4) the modeling of complex topographic effects, and (5) recent developments in air quality monitoring. For individual titles, see N75-14286 through N75-14318.

N75-14286 Environmental Protection Agency, Research Triangle Park, N.C. Meteorology Lab.
MISCELLANEOUS QUESTIONS RELATING TO THE USE OF AIR QUALITY SIMULATION MODELS
K. L. Calder *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 21 p (For availability see N75-14285 05-45)

The critical property of the AQSM for air quality management is the fact that it provides the quantitative causal link between air quality and pollution emissions. In principle it thus allows estimates to be made of the relative contributions of the various individual sources of pollution to the total pollution concentration at any receptor location. The overall AQSM is a composite of many elements or sub-models, such as those for the spatio-temporal distribution of emissions, for atmospheric transport and dispersion, and for physical and chemical transformation and removal processes. Author

N75-14287 NATO Committee on the Challenges of Modern Society.
POTENTIAL APPLICATIONS OF MATHEMATICAL-METEOROLOGICAL DIFFUSION MODELS TO THE SOLUTION OF PROBLEMS OF AIR QUALITY MAINTENANCE
H. Fortak (Inst. fuer Physik der Atmosphaere, West Germany) *In its* Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 109 p refs (For availability see N75-14285 05-45)

The concept of mathematical meteorological simulation of immissions is defined quite generally, and it is shown how problems of immission control strategy can be solved in principle with such simulation models. Special weight is placed on the fact that the most important control measures can be optimized technically and economically by way of a control loop. Existing models are suited for the solution of planning problems. Not only the determination of minimum smokestack heights, but even the planning of changes in the immission climatology are possible already today using the existing models. Author

N75-14288 Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
APPLICATIONS OF AIR QUALITY MODELS BY EPA
Herschel H. Slater *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 10 p ref (For availability see N75-14285 05-45)

To relate the distribution of air quality to the distribution of emissions, considerable dependence is placed on the results of air quality models. But the perfect model is yet to be devised. Monitoring is required to ascertain whether the model which is applied simulates at all realistically the relationships between emissions and air quality. Author

N75-14289 Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
APPLICATION OF IMPLEMENTATION PLANNING PROGRAM (IPP) MODELING ANALYSIS TO THE NEW JERSEY, NEW YORK, CONNECTICUT INTERSTATE AQCR
Herschel H. Slater *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 56 p (For availability see N75-14285 05-45)

A computer oriented system has been employed to evaluate the kind and degree of emission control required to achieve air quality standards for particulate matter and SO2 in the New Jersey-New York-Connecticut Air Quality Control Region. The system utilizes an atmospheric diffusion model which simulates the effect of emissions on ground level pollutant concentrations. Author

N75-14290 Technische Uerberwachungs-Verein Rheinland, e.V., Cologne (West Germany).
USE OF DISPERSION MODELS DURING PLANNING PHASES OF INDUSTRIAL AND DOMESTIC REGIONS
Lothar Kropp *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 15 p refs (For availability see N75-14285 05-45)

A model used for the calculations around plants to be expanded or plants to be settled is given. The model uses the well known formula with Gaussian distributions horizontally and vertically. Calculations are done for gaseous pollutants only and the pollution components do not suffer either physical or chemical

changes in the atmosphere or absorption at the ground. Plume rise is calculated using the formula given by Moses and Kraimer; it takes into account the dynamic and thermic influence on the plume. The dependence of wind speed with height is described by the known power law. Applying this model, air pollution concentrations are calculated at any point downwind from a set of sources that may be point, line or even area sources. Author

N75-14291 Norwegian Inst. for Air Research, Kjeller.
REQUIREMENTS OF AIR QUALITY MODELS FOR LAND USE PLANNING
K. E. Gronskei *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 29 p refs Sponsored in part by EPA (For availability see N75-14285 05-45)

Requirements for the selection and development of air quality models are considered. Different land use planning methods influence the pollution source distribution on different spatial scales, and the statistical parameters describing ambient air concentrations important for different pollutants, area climatology and meteorological situations that affect atmospheric pollutant distribution are also important. G.G.

N75-14292 Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
MODIFIED ROLLBACK MODELS
Roger Morris and Herschel H. Slater *In* Nato Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 22 p refs (For availability see N75-14285 05-45)

Several very basic assumptions are made when a rollback model is used: (1) The indicator of air quality is representative of the air quality distribution over the region of interest; (2) the distribution of emissions in space and time is relatively stable over the projection period; (3) the meteorological and topographical characteristics of the area are stable over the projection period, and (4) the average background concentration remains constant over the projection period. The modified rollback model is fundamentally an emission accounting and projection scheme. Author

N75-14293 Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
POINT-SOURCE PLUME MODELS
Herschel H. Slater *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 14 p refs (For availability see N75-14285 05-45)

Construction of continuous point source atmospheric pollution models requires the input of meteorological and climatological data to assign appropriate numerical values to wind speed, dispersion parameters, and emission rates in order to provide estimates for pollutant concentrations and environmental impact on air quality. G.G.

N75-14294 Environmental Protection Agency, Research Triangle Park, N.C. Monitoring and Data Analysis Div.
APPLICATION OF A MULTIPLE SOURCE URBAN MODEL
Herschel H. Slater and Joseph A. Tikvart (NOAA) *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 15 p (For availability see N75-14285 05-45)

The application of a rudimentary Gaussian multi-source model provided helpful data on the distribution of stable pollutants in several urban areas. It provided gross indications of the geographical extent of the more serious contamination, identified many of the major sources of contamination and gave a gross indication of the degree of emission control needed. Surprisingly, on several occasions results indicated serious deficiencies in the emission inventories. Author

N75-14295 Air Pollution Control Directorate, Ottawa (Ontario).
THE USERS' NEED FOR PRECISE DESCRIPTION AND VERIFICATION OF A MODEL
A. Corlin *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 4 p (For availability see N75-14285 05-45)

Conditions for using air pollution models in the control and management of air quality require precise details on output and input since the models ability to predict air pollution concentrations is the main justification for it's use. Root mean square difference calculations between observed and calculated values provide for goodness of fit. Source strength data and meteorological conditions are needed to supply knowledge on the spatial variation of urban air pollution concentration. G.G.

N75-14296 Environmental Protection Agency, Research Triangle Park, N.C. Meteorology Lab.
LINE SOURCE MODELING
D. Bruce Turner *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 24 p refs (For availability see N75-14285 05-45)

Estimation of air pollutant concentrations from line sources such as highways and airport runways is discussed. Emphasized is the Gaussian plume approach applicable when there is undisturbed horizontal flow from the source to the receptor. Results are given for an example of the estimation of particulate sulfate concentrations from motor vehicles. Sensitivity to atmospheric stability and to the angle between wind direction and source orientation is shown. Sufficient comparisons have been made with field measurements to give some degree of confidence in the use of this model. Author

N75-14297 Air Pollution Control Directorate, Ottawa (Ontario).
A RATIONAL AIR POLLUTION SURVEILLANCE NETWORK DESIGN
R. Lafleur *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 15 p refs (For availability see N75-14285 05-45)

The rational design of air pollution surveillance network is possible with the help of two basic and complementary tools: The emission inventory and the dispersion model. Simple climatological models are capable of providing reliable information for the design of networks and can operate within the constraints of such a network design project. This statement applies only for pollution by SO2 and particulates. Author

N75-14298 Battelle Inst., Frankfurt am Main (West Germany).
APPLICATION OF THE AQDM MODEL AND THE ATDL MODEL AND COMPARISON OF THE RESULTS
J. K. Strott *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 19 p refs (For availability see N75-14285 05-45)

The AQDM gives a fairly good estimate of the ground level concentration, while the results of the ATDL model are unreliable with the grid width used. Since the computation time for the ATDL model is by a factor of 20 less than the computation time for the AQDM, the ATDL model should be modified for smaller grids and used for rough estimates. The unmodified ATDL model can only be used with larger grids (5 km grid width) for survey of air pollution in large regions. Author

N75-14299 Environmental Protection Agency, Research Triangle Park, N.C. Meteorology Lab.
EPISODE PLANNING
L. E. Niemeyer *In* NATO Comm. on the Challengenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 12 p refs (For availability see N75-14285 05-45)

Air pollution episodes are still a real problem and may be expected to occur again when the appropriate source and weather conditions occur simultaneously. Meteorological surveillance is an available technique which should be used to predict possible high pollutant concentrations. Author

N75-14300 IBM Italia, Venezia.
AN INTRODUCTION TO THE VENICE AIR POLLUTION PROJECT
E. Runca *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 14 p refs (For availability see N75-14285 05-45)

Along with the validation of the simple Gaussian diffusion model, an effort is made to implement an air quality model able to incorporate the main features of local air dynamics. The design of such a model requires more accurate data than the ones collected up to now. It seems that the emissions inventory organized by the local authority, the data gathered by the two main networks and some other measurements planned by the CNR (Consiglio Nazionale Ricerche) will supply the required data. An effort should be made to understand the influence mainly during calm conditions, of the heat islands effects caused by the Mestre-Marghera industrial zone and Venice, and the breeze effects upon the dispersion of pollutants in the area examined.
Author

N75-14301 NATO Committee on the Challenges of Modern Society.
URBAN PLANNING UTILIZING A REGIONAL ATMOSPHERIC SIMULATION MODEL
A. E. Boyer (Ontario Ministry of the Environment) and K. C. Heidorn (Ontario Ministry of the Environment) *In its* Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 17 p refs Presented at the 8th Ann. Congr., Can. Meteorol. Soc., Toronto, 29-31 May 1974 (For availability see N75-14285 05-45)

The development of Urban Air Quality Simulation models to cover multi-urban and regional simulations is discussed. The models were based on a pollutant inventory for the area from Toronto to Hamilton and the Niagara Peninsula of Ontario, Canada, as well as an interface with the pollutant inventory for the State of New York. The dimensions of the models range from 40 kilometers for the urban model to 160 kilometers for the regional model. The application of the models to urban planning and development is described. A table of data showing the major contributors to specific air pollution is included. Author

N75-14302 NATO Committee on the Challenges of Modern Society.
THE UTILIZATION OF AN URBAN AIR POLLUTION MODEL IN AIR MANAGEMENT
L. Shenfeld and A. E. Boyer *In its* Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 35 p refs (For availability see N75-14285 05-45)

The development of a multiple-source urban diffusion model for metropolitan Toronto, Canada is discussed. The model was adapted from a regional model originally designed for the State of Connecticut. The modifications made in the original model are described. The emission inventory system, the meteorological input, the verification of the model, and the applications which have been carried out by the Ontario pollution control authority are reported. Author

N75-14303 Environmental Protection Agency, Research Triangle Park, N.C. Meteorology Lab.
CONSIDERATIONS OF THE US REGIONAL AIR POLLUTION STUDY
Douglas G. Fox *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 26 p refs (For availability see N75-14285 05-45)

The progress of the Regional Air Pollution Study (RAPS) for St. Louis, Missouri is discussed. The program is designed to collect data on air quality and to describe meteorological conditions in the urban area. The data are presented in the form of formatted computer tapes. The goal of the study is stated as developing and validating useful air quality simulation models based on terms of pollution control relative to the Environmental Protection Agency current standards. The subjects considered: (1) the nature of the ultimate air quality model, (2) the functions and nature of the research into air quality, and (3) comparative studies to determine areas where additional model development and validation are required. Author

N75-14304 Environmental Protection Agency, Washington, D.C. Meteorology Lab.
A COMMON DATA BASE FOR AIR QUALITY MODELING
R. E. Ruff *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 5 p (For availability see N75-14285 05-45)

The development of a data bank for test and comparison of air quality models is proposed. The data bank would reside on a universally compatible magnetic tape and consist of a test data set of about 30 days, consisting of one-hour averages for wind speed and direction, atmospheric stability, pollutant concentrations, and emission inventory estimates. It is stated that the Regional Air Pollution Studies (RAPS) would be the best source available for this information. Various reasons in favor of establishing such a data base and the type of information which it should contain are presented. Author

N75-14305 Swedish Meteorological and Hydrological Inst., Stockholm.
VALIDATION OF URBAN AIR POLLUTION DISPERSION MODELS
Lars E. Olsson and Sture Ring *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 12 p refs (For availability see N75-14285 05-45)

The techniques for evaluating urban air pollution dispersion models are described. The basic input parameters to a meteorological dispersion model are identified. The validation methods considered are: (1) time series comparison, (2) regression analysis, (3) frequency distribution, and (4) spatial distribution. The problems involved in establishing correlation of data and the allowable error range are analyzed. A flowchart for the development and application of an air pollution dispersion model is included.
Author

N75-14306 GEOMET, Inc., Rockville, Md.
VALIDITY AND SENSITIVITY ANALYSIS OF THE GAUSSIAN PLUME MULTIPLE-SOURCE URBAN DIFFUSION MODEL
Robert C. Koch and Scott D. Thayer *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 16 p Repr. from the Conf. on Urban Environ. and Second Conf. on Biometeorol., Philadelphia, 31 Oct. - 2 Nov. 1972 (For availability see N75-14285 05-45)

The application of a multiple-source Gaussian plume model for analyzing urban air pollution is discussed. A basic assumption in using the Gaussian plume equation to estimate pollutant concentrations in urban air is that the dynamics of the concentration field can be approximated by a sequence of relatively short steady-state periods. The basic output from the model was the spatial distribution of one-hourly average sulfur dioxide concentration values. Algorithms were available to provide statistical properties of these distributions such as the concentration frequency distributions, long term average values of concentration, and concentration contributions from area source emissions.
Author

N75-14307 Royal Inst. of Tech., Stockholm (Sweden).
COMPUTING OPTIMAL AIR POLLUTION ABATEMENT STRATEGIES
S. A. Gustafson *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 24 p refs (For availability see N75-14285 05-45)
(Grant NSF GK-31833)

A method for calculating optimal air pollution abatement strategies applicable to multiple source areas is presented. The basic constraints of the method are consideration of only one type of pollutant and the problem of long term air pollution abatement. It is assumed that the sources can be divided into several groups which can be regulated independently and that the groups of sources combine according to the superposition principle. The numerical procedures for analyzing the basic data are discussed. Specific attention is paid to the determination of transfer functions and the selection of preference function. Mathematical models are developed to support the theoretical aspects. The approach was tested on Stockholm, Sweden and results of the tests are provided. Author

N75-14308 Environmental Research and Technology, Inc., Lexington, Mass.
MODELING FOR SUPPLEMENTARY CONTROL SYSTEMS
Bruce A. Egan *In* NATO Comm. on the Challenges of Mod.

Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 28 p ref (For availability see N75-14285 05-45)

Supplementary emission control systems used by power generating and industrial installations are discussed. The systems are identified as: (1) fuel switching, (2) load shifting, and (3) process curtailment. The procedures used by specific industries are analyzed. The principle considerations in determining supplementary emission control acceptability and reliability are discussed. A mathematical description of a supplementary emission control system is developed. It is stated that the test program can consist of continuous real time operation of the system, recording of all predicted parameter values, and the determination of system reliability based on the analysis program. The results in conjunction with a description of the supplementary control system can be submitted to the control agency as a demonstration of the ability of the system to meet prescribed standards. Author

N75-14309 Technical Univ. of Denmark, Lyngby. Lab. of Heating and Air Conditioning.

ON THE LOGNORMAL DISTRIBUTION OF AIR POLLUTION DATA

David T. Mage *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 10 p refs (For availability see N75-14285 05-45)

A mathematical representation for air pollution concentration analysis is developed. The derivation is based on the assumption that air pollution concentrations are a function of many random processes occurring simultaneously. An equation representing this condition is provided. The parameters of the equation are described. A comparison of the results obtained from actual readings of conditions in Washington, D.C. for a twelve hour period are compared with the data produced by the mathematical models. Author

N75-14310 Danish Atomic Energy Commission, Risoe.

STATISTICAL DESCRIPTION OF AIR POLLUTION CONCENTRATION, AVERAGING TIME AND FREQUENCY

S. E. Larsen and E. L. Petersen *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 8 p refs (For availability see N75-14285 05-45)

An empirical model for the relation between air pollution concentration frequencies and averaging time is discussed. The model is formulated on two considerations: (1) concentrations are approximately lognormally distributed for all pollutants in all cities for all averaging times and (2) the median concentration is proportional to averaging time to an exponent and thus plots as a straight line on logarithmic presentation. Specific examples of the use of the mathematical models are provided. Curves are provided to show the effects of frequency of pollution occurrence as compared with specific time intervals. Author

N75-14311 Environmental Protection Agency, Washington, D.C. Meteorology Lab.

FLUID MODELING PROGRAM OF THE METEOROLOGY LABORATORY, US ENVIRONMENTAL PROTECTION AGENCY

W. H. Snyder *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 47 p refs (For availability see N75-14285 05-45)

The development and operation of a meteorological wind tunnel for simulating atmospheric conditions are discussed. The types of tests conducted in the tunnel are explained. Emphasis is placed on the flow conditions in urban areas with respect to stack downwash from industries, negatively buoyant exhaust plumes, and the effects of automobile exhaust gases in streets. Diagrams of the facility are provided. Photographic records of the flow visualization processes are included. Data resulting from various tests are presented in tables and graphs. Author

N75-14312 Electricite de France, Chatou.

A QUANTITATIVE APPROACH TO CLIMATOLOGICAL SITE STUDY

J. P. Granier, P. Mery, and A. Saab *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 21 p (For availability see N75-14285 05-45)

The problem of predicting the levels of air pollution which may be created by a conventional power plant prior to its operation is discussed. The problems involved in predicting the degree and type of pollution are identified as: (1) topographical effects, (2) meteorological parameters which characterize the structure of the local atmospheric boundary layer, and (3) the influence of the site characteristics on the rate of dispersion. A block diagram of the procedure for analyzing the parameters. Mathematical models are developed to establish the relationships between the parameters. The situation with respect to a village in France is used as an example. Author

N75-14313 Environmental Protection Agency, Research Triangle Park, N.C. Meteorology Lab.

RESEARCH PROGRAM OF MODEL DEVELOPMENT BRANCH OF THE EPA

Douglas G. Fox *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 29 p refs (For availability see N75-14285 05-45)

A review of the existing and anticipated research and development activities of the Model Development Branch of the Environmental Protection Agency is presented. Long term goals are outlines as are interim steps in the achievement of these goals. The following areas of activity are considered: (1) urban meteorology, (2) atmospheric structure modeling, (3) atmospheric transformation modeling, (4) model validation, and (5) physical modeling. Author

N75-14314 Systems Applications, Inc., Beverly Hills, Calif.

ASSESSMENT OF THE VALIDITY OF AIRSHED MODELS

Mei-Kao Liu, John H. Seinfeld, and Philip M. Roth *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 16 p refs (For availability see N75-14285 05-45)

The development of short term photochemical models capable of predicting the spatial and temporal variations in air quality over the course of one day or longer is discussed. The methods are identified as (1) trajectory models and (2) grid models. Trajectory models are based on the numerical analysis of concentrations in a moving column of air as it traverses an airshed. Grid models are based on dividing the modeling region into a discretized, three-dimensional grid and solving by the use of appropriate numerical techniques. Specific examples of the use of each method are provided. A qualitative assessment of the validity of the two systems is presented in tabular form. Author

N75-14315 Technology Service Corp., Los Angeles, Calif.

EMPIRICAL APPROACHES TO AIR QUALITY AND METEOROLOGICAL MODELING

W. S. Meisel *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 13 p refs (For availability see N75-14285 05-45)

The application of empirical approaches to the analysis of air quality problems is discussed. The sources of the increased interest, possible uses of empirical approaches, difficulties associated with empirical analysis of air quality data, and approaches to overcoming the difficulties are considered. An example of the complementary nature of physical and empirical approaches to air quality analysis is provided. An example of the application of the method to the transportation emission control policy evaluation is developed. Author

N75-14316 Technische Hochschule, Darmstadt (West Germany). Inst. for Meteorology.

DISPERSION FROM TALL STACKS

Werner Klug *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 8 p (For availability see N75-14285 05-45)

A method for evaluating a procedure for determining the contribution of smokestacks to air pollution is described. A specific example of an electric power generating plant in Kentucky is

presented. The procedures for calculating the surface concentrations at a receptor point are explained. An analysis of the system shows that the scheme which relates vertical temperature differences to stability classes is not optimal. Author

N75-14317 British Meteorological Office, Bracknell (England).
SOME VIEWS ON MODELING DISPERSION AND VERTICAL FLUX
F. B. Smith *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 6 p refs (For availability see N75-14285 05-45)

Semi-empirical predictions of the vertical and lateral spread of a point source plume, and of the effective height of the source in the case of hot chimney effluent are presented. The sources and extent of errors in the model are explained. Mathematical models are developed for various aspects of the air pollution distribution. It is concluded that in its most practical form (plume modeling) the basic first order conservation is fully implied. Author

N75-14318 National Oceanic and Atmospheric Administration, Washington, D.C.
FURTHER COMPARISON OF URBAN AIR POLLUTION MODELS
F. A. Gifford *In* NATO Comm. on the Challenges of Mod. Soc. Proc. of the 5th Meeting of the Expert Panel on Air Pollution Modeling Aug. 1974 9 p refs (For availability see N75-14285 05-45)

Urban diffusion models of atmospheric diffusion and air pollution are compared. The points of correlation between the models are identified. A statistic based on space and time averaging for each model is presented. This is the standard deviation of the ratio of the predicted to the observed concentration values of each station for each hour. It is stated that correlations of either space or time concentration patterns for the simple model were generally as high or higher than those for the complex model. Author

N75-14319# Allied Chemical Corp., Idaho Falls, Idaho.
REDUCTION OF NO(SUBx) WITH AMMONIA OVER ZEOLITE CATALYSTS
T. R. Thomas and D. T. Pence 1974 12 p refs Presented at the Air Pollution Control Assoc. Meeting, Denver, 10 Jun. 1974
(Contract AT(10-1)-1375)
(Conf-740614-4) Avail: NTIS HC $3.25

The NOx and SO2 abatement technology was investigated, with emphasis on application to coal-fired power plants. The process involves the reduction of nitric oxide with gaseous ammonia using a zeolite catalyst. Removal of 98.6% of the 500 ppm NO in a simulated flue gas atmosphere containing 3000 ppm SO2 was achieved at a bed temperature of 660 F and space velocity of 6000/hr. The potential for a combined NOx-SO2 abatement system and a cursory cost analysis are discussed. Author

N75-14320# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
AIR POLLUTION AND WARM FOG MODIFICATION Environmental Research Papers
Alan I. Weinstein 25 Jun. 1974 19 p refs
(AF Proj. 8620)
(AD-786454; AFCRL-TR-74-0289; AFCRL-ERP-480) Avail: NTIS CSCL 04/1

Through a series of simple calculations on monodispersed fogs, it is shown that atmospheric air pollutants in the form of cloud condensation nuclei (CCN) contribute to a lowering of the visibility and, thereby, seriously inhibit the visibility-improving capability of some evaporation techniques of warm fog modification. In extreme pollution, where the CCN counts are in excess of 1000/cc and the initial visibility is, therefore, very low, those techniques that only depress relative humidity a few percent, for example, hygroscopic particle seeding, could be rendered almost powerless in improving visibility to practically useful levels. Those fog dispersal techniques that of practical necessity generally depress the relative humidity by more than five % such as thermal fog dispersal, are not so seriously hampered by atmospheric pollutants. (Modified author abstract) GRA

N75-14321# Research Triangle Inst., Durham, N.C.
CONCEPTS FOR DEVELOPMENT OF FIELD USABLE TEST ATMOSPHERE GENERATING DEVICES Final Report, 1 Jul. - 30 Dec. 1973
Dec. 1973 167 p refs
(Contract EPA-68-02-1242)
(PB-235774/7; EPA-650/4-74-016) Avail: NTIS HC $6.25 CSCL 13B

Physical, physical plus chemical, and biological concepts applicable to the development of field usable test atmosphere generating devices were examined for pollutants. The primary activity for application of these devices was the round-robin survey to assess instrument-operator performance on a routine periodic basis. The program was divided into three distinct phases: (1) comprehensive literature search and preparation of technical discussions; (2) panel review of the discussions; and (3) comparative evaluation. (Modified author abstract) GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N75-14322 + Engineering Sciences Data Unit, London (England).
CHARACTERISTICS OF ATMOSPHERIC TURBULENCE NEAR THE GROUND. PART 1: DEFINITIONS AND GENERAL INFORMATION
Oct. 1974 19 p refs Sponsored by Roy. Aeron. Soc., Inst. of Chem. Engr., Inst. of Mech. Engr., and Inst. of Structural Engr.
(ESDU-74030) Copyright. Avail: NTIS HC $74.50

General information concerning the definitions and physical significance of the statistical properties used to describe the characteristics of atmospheric turbulence is provided. The information is applicable to the calculation of dynamic wind loads on, and response of, ground-based structures and aircraft in atmospheric turbulence. Author

N75-14323 + Engineering Sciences Data Unit, London (England).
CHARACTERISTICS OF ATMOSPHERIC TURBULENCE NEAR THE GROUND. PART 2: SINGLE POINT DATA FOR STRONG WINDS (NEUTRAL ATMOSPHERE)
Oct. 1974 35 p refs Sponsored by Roy. Aeron. Soc., Inst. of Chem. Engr., Inst. of Mech. Engr., and Inst. of Structural Engr.
(ESDU-74031-Pt-2) Copyright. Avail: NTIS HC $146.50

The statistical properties of turbulence in the atmospheric boundary layer at a single point in space appropriate to a particular problem are determined. The properties considered are presented in graphical and equation form for heights up to 300 m. The statistical properties presented are derived from world-wide measurements in the atmospheric boundary layer and can be taken to apply to any geographical location in the world for strong wind or neutral atmosphere conditions. The data are applicable to the calculation of dynamic wind loads on, and response of, ground-based structures and aircraft in atmospheric turbulence. Author

N75-14324# Academy of Sciences (USSR), Moscow. Inst. for Space Research.
DIRECT MEASUREMENTS OF ION DRIFT VELOCITY IN THE UPPER IONOSPHERE DURING A MAGNETIC STORM. PART 1: EXPERIMENT DESCRIPTION AND SOME RESULTS OF MEASUREMENTS DURING MAGNETICALLY QUIET TIME
Y. I. Galperin, V. N. Ponomarev, and A. G. Zosimova 23 Oct. 1973 26 p refs Repr. from Cosmicheskie Issledovanija, v. 11, no. 2, 1973 p 273-283
(PR-159) Copyright. Avail: Issuing Activity

In October-November 1967, asymmetry of the free-stream flow of ambient ionospheric plasma around a satellite caused mainly by the plasma drift or convection under action of the dc electric field was measured onboard the Cosmos-184 Satellite. Geometry and reduction techniques for these measurements from a satellite oriented along the velocity vector were considered. The deviations of the satellite orientation relative to the velocity

vector as well as additional asymmetry arising in the free-stream flow due to the effects of the geomagnetic field are specified as the main sources of errors for these measurements. Measurements carried out during magnetically quiet time conditions were analyzed. They showed the presence of high horizontal drift velocities in a zone of oval shape, close to auroral oval, but extended to lower geomagnetic latitudes. Author (ESRO)

N75-14325# Danish Meteorological Inst., Copenhagen.
RUDE SKOV GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1970
1974 44 p
(ISBN-87-7478-087-5) Avail: NTIS HC $3.75

Results of the standard observations carried out at Rude Skov magnetic observatory are reported. Photographic records from three variometers were used to obtain the values. Methodology is detailed and base values are given. Hourly means, daily means, and averages of all days of the month for each hour are presented in tabular form. N.E.R.

N75-14326# Danish Meteorological Inst., Copenhagen.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1970
1974 57 p refs
(ISBN-87-7478-091-3) Avail: NTIS HC $4.25

The three magnetic elements H, D, and Z were regularly recorded by means of three sets of photographic variometers: two standard magnetographs, a sensitive and an insensitive, and a quick-run magnetograph. Baseline values were determined for the variometers and linear reduction formulas were used for the magnetic elements. The stability of the scale values was checked by means of a Helmholtz-Gaugaim coil as well as graphically by smoothing the baseline measurements as a function of the ordinate scaled on the magnetograms. Author

N75-14327# Danish Meteorological Inst., Copenhagen.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1969
1974 56 p
(ISBN-87-7478-090-5) Avail: NTIS HC $4.25

For abstract, see N75-14326.

N75-14328# California Univ., Livermore. Lawrence Livermore Lab.
EFFECT OF STRATOSPHERIC AEROSOL ON LONGWAVE RADIATIVE FLUXES: VARIATION WITH LATITUDE AND SEASON
F. M. Luther 19 Jul. 1974 8 p refs Sponsored in part by DOT
(Contract W-7405-eng-48)
(UCID-16559) Avail: NTIS HC $3.25

The effect of increased stratospheric aerosol on longwave radiation is estimated for summer and winter seasons at other latitudes. Results show an increase in the downward longwave flux into the troposphere, which is greater at higher latitudes and larger in summer than in winter. The decrease in outgoing radiation is smaller at higher latitudes, and the magnitude is larger in summer than winter. N.E.R.

N75-14329# California Univ., Livermore. Lawrence Livermore Lab.
SOME STUDIES OF DEEPLY BURIED HIGH EXPLOSIVE ROCK FRACTURING
Z. R. Butkovich 20 Jun. 1974 21 p refs
(Contract W-7405-eng-48)
(UCID-16526) Avail: NTIS HC $3.25

The use of high explosives for fracturing rock is studied. A high speed digital computer was utilized with a one-dimensional code designed to calculate the propagation of a stress wave generated by an underground explosion, and the accompanying displacement and fracture of the surrounding rock. The calculations were driven by a pressure-specific volume relationship describing the expansion of the gases generated by the detonation of high explosives. The calculations show that the final cavity pressure at which cavity growth ceases is controlled by the strength of the rock, the overburden stress, and the size of the shot hole. The final cavity size is approximately linearly related to the failure radius. The characteristics of the explosives which affect the cavity size are detailed. N.E.R.

N75-14330# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
SUPERSONIC PLASMA FLOW BETWEEN MAGNETICALLY CONJUGATED HIGH LATITUDE IONOSPHERES. A PRODUCTION MECHANISM FOR MAINTAINING THE POLAR WINTER NIGHT IONOSPHERE? [PLASMAUEBERSCHALLSTROEMUNG ZWISCHEN MAGNETISCH KONJUGIERTEN IONOSPHAEREN HOHER BREITEN: EIN NACHLIEFERUNGSMECHANISMUS ZUR AUFRECHTERHALTUNG DER POLAREN WINTERNACHTIONOSPHAERE?]
Gernot Roesler Apr. 1974 149 p refs In GERMAN
(MPI-PAE/Extraterr-97) Avail: NTIS HC $5.75

Investigations were made on whether the nighttime ionosphere can be in equilibrium as a result of an inflowing hypersonic plasma in the form of polar wind from the daytime ionosphere. The inflow of the polar wind was shown to affect only slightly ion densities in the F layer range as a result of reduction in plasma flow penetrating into the outflowing shock wave, but the ionization of a flux tube above 1000 km altitude varied rapidly as a result of compression and strong heating of H-ions in the shock waves. ESRO

N75-14331# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Flugfunk und Mikrowellen.
THEORETICAL INVESTIGATIONS ON THE DETERMINATION OF THE VERTICAL TEMPERATURE DISTRIBUTION IN THE ATMOSPHERE ASSUMING MULTISPECTRAL THERMAL RADIATION MEASUREMENTS AT 60 GHz [THEORETISCHE UNTERSUCHUNGEN IM HINBLICK AUF DIE BESTIMMUNG DER TEMPERATURVERTEILUNG IN DER ATMOSPHAERE UNTER DER ANNAHME MULTISPEKTRALER MESSUNGEN DER THERMISCHEN STRAHLUNG BEI 60 GHz]
Friedrich Malota and Volker Stein Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 71 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-W-74-04) Avail: NTIS HC $4.25; ZLDI, Munich 14,95 DM

Vertical atmospheric temperature distribution was derived from microwave thermal radiation measurements. The radiation transfer equation is discussed, notably correlation between environmental temperature and noise temperature, temperature distribution models and the influence of clouds on noise temperature. Information content and numerical solution methods of indirect temperature observations are dealt with, and noise temperature simulation calculations and inversion calculations for temperature profiles are presented. ESRO

N75-14332# Royal Netherlands Meteorological Inst., De Bilt.
ACOUSTIC SOUNDING EQUIPMENT [AKOESTISCHE SONDERINGSAPPARATUUR]
A. Driedonks 1974 28 p refs In DUTCH; ENGLISH summary
(KNMI-WR-74-13) Avail: NTIS HC $3.75

A survey of acoustic detection and ranging (ACDAR) techniques for determination of meteorological parameters in the atmospheric boundary layer is presented. An ACDAR was installed at 300m from a 200m high meteorological mast. Comparisons were made between the ACDAR recordings and measurements at the mast, including temperature and visibility at different altitudes. Results are quite similar. ESRO

N75-14333# Royal Netherlands Meteorological Inst., De Bilt.
DETERMINATION OF THE WIND DRAG COEFFICIENT OVER WATER WITH A NUMERICAL MODEL [BEPALING VAN DE WINDSCHUIFSPANNINGSCOEFFICIENT BOVEN WATER MET EEN NUMERIEK MODEL]
H. H. Peeck 1974 29 p refs In DUTCH; ENGLISH summary
(KNMI-WR-74-8) Avail: NTIS HC $3.75

The application of a numerical model to estimate the drag coefficient over open water is described with wind speed at 10 m. Reliable wind and hydrographical measurements were made. These measurements are suitable for hindcast computation

of the wind setup. The numerical model is an implicit, nonlinear method for hydrodynamical computations. Author (ESRO)

N75-14334# Aeronautical Research Associates of Princeton, Inc., N.J.
A COUPLED TWO-DIMENSIONAL DIFFUSION AND CHEMISTRY MODEL FOR TURBULENT AND INHOMOGENEOUSLY MIXED REACTION SYSTEMS
Glenn R. Hilst, Coleman duP. Donaldson, Milton Teske, Ross Contiliano, and Johnny Frieberg Mar. 1973 95 p refs
(Contract EPA-68-02-0014)
(PB-234193/1; ARAP-186-Vol-3; EPA-R4-73-016c) Avail: NTIS HC $4.75 CSCL 04A

The primary intent of the work has been the assessment of the combined effects of turbulent diffusion and inhomogeneous chemistry on the dispersion and chemical alteration of reactive pollutants and natural consituents of the lower atmosphere. The fundamental chemical kinetic equations for an inhomogeneously mixed binary reaction system are derived exactly and solved for various initial conditions in order to assess the effects of inhomogeneous mixing on chemical reaction rates. These effects are shown to be highly significant in several atmospheric chemistry situations, particularly when the reactants emanate from multiple sources. An approximate second-order closure of the chemical sub-model is then developed and coupled with the second-order (invariant) turbulent diffusion model. Initial calculations of the interaction of turbulent diffusion and chemical reactions are presented, including a simulation of a multiple freeway situation. Conditions under which chemical reactions are diffusion and mixedness limited are illustrated. GRA

N75-14335# Ohio State Univ., Columbus. Dept. of Geodetic Science.
SOME FIRST ACCURACY ESTIMATES FOR APPLICATIONS OF AERIAL GRADIOMETRY
Helmut Moritz Jul. 1974 78 p refs
(Contract F19628-72-C-0120; AF Proj. 8607)
(AD-786418; DGS-209; AFCRL-TR-74-0317; SR-18) Avail: NTIS CSCL 08/5

Estimates of accuracies obtainable in the geodetic use of aerial gradiometry are given. For simplicity, mainly the second vertical gradient T sub zz is considered; the use of other gradients and their optimal combination by least-squares collocation is also outlined. GRA

N75-14336# GEOMET, Inc., Rockville, Md.
SPACE FORECAST TECHNIQUES Final Report, 1 Jul. 1972 - 30 Jun. 1974
Demetrios J. Moschandreas, Isadore Enger, and Paul H-J. Hwang 28 Jun. 1974 94 p refs
(Contract F19628-73-C-0015; AF Proj. 8666)
(AD-786415; GEOMET-MF-329; AFCRL-TR-74-0299) Avail: NTIS CSCL 04/1

The Regression Estimation of Event Probabilities (REEP) technique was used for predicting the duration of the largest short-wave fadeout expected to occur tomorrow from information available today. A computer program was developed and adapted to the Air Force Global Weather Central computers to estimate (s sub p) values, in real-time, rapidly from observations made at four stations given that the observations are missing sporadically and randomly. Feasibility of using REEP to investigate the fOF2 behavior during a geomagnetic storm was studied. Regression equations were developed for predicting the 2-12A X-ray flux tomorrow given a series of relevant parameters today. GRA

N75-14337# Dewey Electronics Corp., Paramus, N.J.
AN R AND D EFFORT TO STUDY THE CHEMISTRY OF A DISTURBED IONOSPHERE Final Technical Report
M. N. Hirsh and K. Raj Jul. 1974 244 p refs
(Contract DAAD05-71-C-0284)
(AD-785713; BRL-CR-169) Avail: NTIS CSCL 04/1

This report presents a compendium of mass spectrometer measurements of positive and negative ion spectra obtained during the irradiation of airlike gas mixtures by relativistic electrons, under conditions which partially simulate the nighttime disturbed stratosphere. The measurements were performed to provide a data base, obtained under controlled laboratory conditions, for comparison with the predictions of multispecies atmospheric chemistry codes, to test the validity of the codes. Measurements were made at pressures of 1, 2, and torr, and at 300K, in each of three sample atmospheres, each containing essentially 80% N2, 20% O2, but differing in the concentrations of H2O and CO2. Considerable effort has been devoted to determining the quantitative variation of relative ion currents with the various operating parameters of the mass spectrometer, an rf monopole mass filter, and its associated ion sampling and detection systems. (Modified author abstract) GRA

N75-14338# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TOWARD A THEORY OF DISTURBANCE OF THE LOWER IONOSPHERE BY A METAL BODY
A. A. Yastrebov 26 Aug. 1974 19 p refs Transl. into ENGLISH from Tr. Tsentr. Aerolog. Observ. (Moscow), no. 3, 1972 p 35-43
(AD-786000; FTD-HC-23-1863-74) Avail: NTIS

The disturbance was investigated of a dense, weakly ionized plasma by a stationary charged, spherically-shaped body in a steady state system. By hydrodynamic approximation, the problem was transformed to the solution of a nonlinear boundary value singular problem with nonhomogenous boundary conditions. Numerical solutions were found and analyzed. Other topics discussed include: stripping regions, electron and ion concentrations, ionospheric plasma, and stationary plasma. M.J.S.

N75-14339# General Electric Co., Santa Barbara, Calif. Dasiac.
REACTION RATE DATA. NUMBER 46
Apr. 1974 28 p
(Contract DNA001-74-C-0014)
(AD-786174) Avail: NTIS

The report contains summaries of ongoing research centering around the area of atmospheric reaction kinetics. Transitions, thermochemistry, energy transfer, reactions, and nuclear fireball effects are some topics included. GRA

N75-14340# International Business Machines Corp., Burlington, Mass.
SOME RECENT INNOVATIONS IN ATMOSPHERIC DENSITY PROGRAMS Scientific Report, 1 Jul. 1973 - 30 Jun. 1974
Arnold S. Bramson and Jack W. Slowey 15 Aug. 1974 86 p refs
(Contract F19628-72-C-0178; AF Proj. 8605)
(AD-786414; AFCRL-TR-74-0370; SR-1) Avail: NTIS CSCL 04/1

This report documents the latest modifications incorporated into a series of computer programs for determining atmospheric densities and for evaluating existing atmospheric density models. Emphasis is placed on requirements for actual program usage, with complete user's manuals and related information appearing as separate appendices. Author (GRA)

N75-14341# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
SEASONAL AND DIURNAL VARIATIONS IN THE TOTAL ELECTRON CONTENT OF THE IONOSPHERE AT INVARIANT LATITUDE 54 DEGREES Environmental Research Papers
Gerald S. Hawkins and John A. Klobuchar 28 Jun. 1974 43 p refs
(AF Proj. 4643)
(AD-786453; AFCRL-TR-74-0294; AFCRL-ERP-482) Avail: NTIS CSCL 04/1

Measurements of total ionospheric electron content (TEC) by Faraday rotation of radio waves are given for the period November 1967 to September 1973 for 136 MHz transmissions from the geostationary satellite ATS-3 observed at a sub-ionospheric invariant latitude of 54 degrees N. The diurnal curves showed the effects of solar radiation and particle precipitation. (Modified author abstract) GRA

N75-14342# Stanford Research Inst., Menlo Park, Calif.
A MULTIPULSE CORRELATOR FOR THE CHATANIKA RADAR Technical Report, Nov. 1972 - Dec. 1973
Charles L. Rino, G. Howard Burch, Murray J. Baron, and Odile DelaBeaujardiere Feb. 1974 102 p refs

(Contract DNA001-72-C-0076; SRI Proj. 1703; DNA Proj. NWET-L25AAXH)
(AD-785824; DNA-3361T; TR-2) Avail: NTIS CSCL 04/1

This report describes the theory and operation of a multipulse correlator for the DNA 617 radar now located at Chatanika, Alaska. The hardware correlator is of a novel design that utilizes patch-wire programming to select the particular lags that are to be computed. The unit can deliver as many as 40 8-bit-by-8-bit signed products every 20 micrometers, at any of 48 3-km range gates that are specified under computer control. (Modified author abstract) GRA

N75-14343# Chicago Univ., Ill. Lab. for Atmospheric Probing.
RADAR MEASUREMENT OF ATMOSPHERIC TURBULENCE Final Report
R. C. Srivastava Sep. 1974 5 p refs
(Contract N00014-67-A-0285-0014; NR Proj. 061-188)
(AD-785969) Avail: NTIS CSCL 04/1

The work performed under the contract was reported in detail in quarterly reports submitted to the Office of Naval Research. In this report, highlights of the work is given with reference to an attached list of publications. The published work may be classified under the three broad headings: (1) Turbulence measurement by radar; (2) Signal statistics; and (3) High resolution FM-CW radar studies. GRA

N75-14344# Naval Research Lab., Washington, D.C.
A NUMERICAL MODEL OF THE MID-LATITUDE IONOSPHERE Interim Report
E. S. Oran, T. P. Coffey, D. F. Strobel, T. R. Young, Jr., and D. V. Anderson Jul. 1974 98 p refs
(NRL Proj. 77A03-16; NRL Proj. 77A03-17)
(AD-785841; NRL-MR-2839) Avail: NTIS CSCL 04/1

A description of the theoretical one-dimensional laminar model of the mid-latitude ionosphere developed at NRL is presented. The physics, chemistry, and approximations that go into the model are described in detail. Radiation deposition and the applicable chemical reactions are discussed, and the multi-fluid equations governing velocities, temperatures, and densities in the ionosphere are reduced to a tractable one-dimensional set of equations with vertical variations. Numerical techniques used in solving the resulting coupled equations are outlined. Finally, preliminary results and future work on model are discussed. Author (GRA)

N75-14345# Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
EFFECT OF PARTIAL VEGETATION AND TOPOGRAPHIC SHADE ON RADIANT ENERGY EXCHANGE OF STREAMS WITH APPLICATIONS TO THERMAL LOADING PROBLEMS
David R. DeWalle Jun. 1974 116 p refs
(Contract DI-14-31-0001-3637)
(PB-236073/3; Pub-82; OWRR-B-043-PA(1)) Avail: NTIS HC $5.25 CSCL 13B

A model was developed and tested for estimation of the effects of partial vegetative and topographic shade on radiation exchange of streams. Theoretical shade effects on direct solar, diffuse solar, reflected solar, transmitted solar radiation, and terrestrial and atmospheric longwave radiation were analyzed. Theoretical and measured downward all wave radiation flux densities compared favorably. Theory and measurements were used to estimate daily and diurnal shade effects on radiation exchange of streams. Maximum shade-induced reductions in daily absorbed solar plus downward longwave radiation occurred for N-S stream azii azimuths, clear days, and large shade altitudes. Shade effects on heat dissipation from thermally loaded streams were inferred from heat balance data. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N75-14346 Wetenschappelijk en Technisch Documentatie- en Informatiecentrum voor de Krijgsmacht, The Hague (Netherlands). Meteorological Section.
SPECIAL METEORLOGICAL PHENOMENA: A BIBLIOGRAPHY FROM JANUARY 1968 TO MARCH 1974
B. Ritsema, comp. Apr. 1974 46 p refs
(TDCK-64275) Avail: Issuing Activity

About 85 abstracts of articles and reports on special meteorological phenomena, published in scientific periodicals between January 1968 and March 1974 are contained in this bibliography. Author (ESRO)

N75-14347 Direction de la Meteorologie Nationale, Paris (France).
GRAPHICAL REPRESENTATION OF OBSERVATIONAL DATA FROM THE BUOY LABORATORY BORHA 1 (PERIOD 1964 - 1970) [REPRESENTATION GRAPHIQUE DE DONNEES D'OBSERVATION A LA BOUEE LABORATOIRE BORHA 1 (PERIODE 1964 - 1970)]
M. Houdart and G. Ratto Jul. 1974 44 p In FRENCH
(Mono-94) Avail: Issuing Activity

Observations of atmospheric humidity and temperature, sea temperature, wind speed and direction made between 1964 and 1970 from the buoy laboratory, Borha 1, in the northern part of the west Mediterranean Sea, are presented in graphical form. ESRO

N75-14348# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
STATISTICAL DISTRIBUTION OF WIND AT THE KAGOSHIMA SPACE CENTER
Yasunori Matogawa Nov. 1974 21 p refs
(ISAS-519-Vol-39-No-16) Avail: NTIS HC $3.25

Wind data from the balloon tracking radar at KSC are utilized to determine statistical wind distributions. The analysis is based on the bivariate normal distribution method. Some of the results obtained by the binormal analysis are compared with those obtained empirically. The assumption of a circular distribution is shown to be invalid for winds at KSC. Author

N75-14349# Massachusetts Inst. of Tech., Cambridge. Dept. of Meteorology.
DIAGNOSTIC STUDIES OF THE GENERAL CIRCULATION OF THE STRATOSPHERE
R. E. Newell, G. F. Herman, J. W. Fullmer, W. R. Tahnk, and M. Tanaka 1974 126 p refs Presented at the 1st Spec. Assembly of the Intern. Assoc. of Meteorol. and Atmospheric Phys., Melbourne, 14 Jan. 1974
(Contract AT(11-1)-2195)
(COO-2195-11; Conf-740106-6; SR-1) Avail: NTIS HC $5.75

New zonally averaged temperature cross-sections for the 200-2 mb layer and wind cross-sections from 200 mb-0.1 mb are presented and the factors controlling the distributions discussed. Momentum and sensible heat fluxes for the layer 200-10 mb are used in the discussion. New heating rate computations are presented for the layer above 10 mb. The energetics is studied on a monthly basis. The need for a long term climatology is stressed. Tabulated values of the basis quantities for the 200-10 mb layer are included. Author

N75-14350# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Inst. fuer Geophysik.
CORRELATION OF METEOROLOGICAL EFFECTS AND DEFLECTION OF THE VERTICAL AT ZELLERFELD-MUEHLENHOEHE STATION [KORRELATION VON METEOROLOGISCHEN EFFEKTEN UND LOTSCHWANKUNGEN AN DER STATION ZELLERFELD-MUEHLENHOEHE]
K. Herbst 1974 15 p In GERMAN Presented at the 34th Ann. Meeting of the Deut. Geophys. Ges. E. V., Berlin, 25-30 Mar. 1974
Avail: NTIS HC $3.25

The effects of atmospheric temperature and pressure on the deflection of inclinometers were investigated by correlation of the related data. Two inclinometer recordings over a period of 15 months, and taken at depths of 30 and 15 m, were available. Air pressure and air temperature values were supplied by a nearby weather station. The data was filtered with a bandpass filter.

having a passband varying from a day and a half to five days. The similarity of both data series was tested with the cross correlation function, and the regression coefficient was calculated for the time shift for which the correlation function has its maximum. ESRO

N75-14351# Royal Netherlands Meteorological Inst., De Bilt.
STABILITY CLASS CLIMATOLOGIES IN THE GAUSSIAN PLUME MODEL [STABILITEITSKLASSE-KLIMATOLOGIEEN IN HET GAUSSISCH PLUIMMODEL]
F. Nieuwstadt 1974 27 p refs In DUTCH
(KNMI-V-258) Avail: NTIS HC $3.75

Stability class climatologies, calculated for the Schiphol weather station and using stability class definitions are discussed. The stability class climatology, calculated from clean synoptic data, differs little from a previous calculation for which raw data were used. Stability class climatologies calculated with various definitions differ greatly. Concentration calculations based on Gaussian plume model distribution were carried out to determine the effects of the stabilization class climatology on long term average concentrate calculations. Various climatologies were used. Results indicate that the sensitivity of the dispersion model is low for a variation of stability class climatology. ESRO

N75-14352# Royal Netherlands Meteorological Inst., De Bilt.
QUALITY CONTROL OF PRECIPITATION MEASUREMENTS OF THE HYDROLOGICAL RESEARCH PROJECT IN OVERIJSSEL [KWALITEITSKONTROLE VAN DE NEERSLAGMETINGEN VAN HET HYDROLOGISCH ONDERZOEK OVERIJSSEL]
G. J. Yperlaan 1974 31 p refs In DUTCH; ENGLISH summary
(KNMI-WR-74-10) Avail: NTIS HC $3.75

Daily precipitation measurements in the eastern part of the Netherlands from April 1970 till September 1972 were processed and quality control was performed on a computer. The control program scrutinized the extreme values of measurements of small groups of stations, indicating them as erroneous, if their probability level was very small. For this purpose precipitation amounts of 4 mm and more, measured simultaneously on rather nearby places, are assumed to be normally distributed. Smaller amounts, however, had a skew distribution. It was shown that it is very unlikely that the measurements of stations at the border of the area evaluated less correctly due to the lack of information from outside the area. It could also be shown that stations with relatively many erroneous measurements were not strongly clustered. Author (ESRO)

N75-14353# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Inst. fuer Turbulenzforschung.
CHANGE OF AIR AND WATER TURBULENCE BY GUSTS [UEBER DIE DURCH WINDBOEEN VERAENDERTE TURBULENZ VON LUFT UND WASSER]
Hans-Georg Moll 18 Jul. 1974 41 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft Prepared jointly with Tech. Univ. Berlin
(DLR-FB-74-54) Avail: NTIS HC $3.75; DFVLR, Porz, West Ger. 16,60 DM

Water wave height, wind velocity, and temperature were measured and analyzed by analog and digital techniques. Gusts were determined during the time sequence of the measurements. Separate gusts were investigated digitally in time slots of 4 seconds, before, during, and after the occurrence of 20 individual gusts. Power spectra and central moments of spectral power density were calculated. It is shown that gusts increase the entire power density of the wind velocity, i.e. they do not affect only special frequency bands, and also that the central moments are not suitable gust indicators. ESRO

N75-14354# Institut Franco-Allemand de Recherches, St. Louis (France).
APPLICATION OF ULTRAFAST MICROHOLOGRAPHY: FOG METROLOGY [UNE APPLICATION DE LA MICROHOLOGRAPHIE ULTRA-RAPIDE: LA METROLOGIE DES BROUILLARDS]
H. Royer 4 Oct. 1973 26 p refs In FRENCH; ENGLISH summmay
(ISL-PU-1/73) Avail: NTIS HC $3.75

Holograms of fogs procuced in a high-altitude propeller test cell were recorded in the following conditions: Pressure 0.5 atm temperature OC and velocity of the fog 100 m/s. The droplet diameters ranged between 5 and 50 microns. Reconstructed images were enlarged x 1000 and visualized with the help of a TV-system. Individual measurements on the particles provided the local concentration and diameter repartition. Moreover the use of double pulse holography gives the three components of the speed vector for each particle. The optical arrangement and apparatus are described. The influence of experimental parameters upon the precision of measures is discussed. Author (ESRO)

N75-14355# Norman Engineering Co., Los Angeles, Calif.
OPERATIONAL THERMAL FOG DISSIPATION SYSTEM AT RAMSTEIN AIR BASE, GERMANY
Ernest L. Kossacoff and Lawrason C. Wilbur 28 Jun. 1974 79 p
(Contract F19628-73-C-0144; AF Proj. 7605)
(AD-786460; AFCRL-TR-74-0320; SR-1) Avail: NTIS CSCL 04/2

The report presents the results of the feasibility and maximum cost study on the application of a momentum source thermal fog dissipation system at Ramstein AB, Germany. Supplied criteria such as conservative estimate of burner spacing, heat output, system utilization statistics, etc., are used to arrive at a basic configuration. Each major subsystem is then analyzed in detail in order to allow identification of areas where significant cost savings could be realized. Outline specifications as well as cost estimates, drawings and calculations are presented. Two appendices contain information on cost variations created by changing the system configuration and burner spacing.
Author (GRA)

N75-14356# Environmental Prediction Research Facility (Navy), Monterey, Calif.
A TROPICAL CYCLONE ANALOG PROGRAM FOR THE NORTH INDIAN OCEAN
Samson Brand, James M. Long, Jack W. Blelloch, and Glenn D. Hamilton Aug. 1974 21 p refs
(WF52511713)
(AD-786347; ENVPREDRSCHF-Tech-Paper-11-74) Avail: NTIS CSCL 04/2

A tropical cyclone analog program for the North Indian Ocean area (INJAH74) is described. The program is a statistical computer technique to provide forecasts for Bay of Bengal and Arabian Sea tropical cyclones from 12-72 hours. The analog program is discussed in terms of its operational use at Fleet Weather Central/Joint Typhoon Warning Center, Guam, Mariana Islands.
Author (GRA)

N75-14357# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TECHNIQUES FOR CALCULATING THE CORRELATION FUNCTIONS AND SPECTRA OF METEOROLOGICAL TIME SERIES
K. Ya. Vinnikov, N. K. Grib, and I. I. Polyak 26 Jul. 1974 31 p refs Transl. into ENGLISH from Tr. Gl. Geofiz. Observ. (Leningrad), no. 308, 1973 p 27-46
(FTD Proj. T74-01-19)
(AD-786107; FTD-HC-23-2163-74) Avail: NTIS

A technique is considered for calculating the correlation functions and spectra of meteorological series. The formulas of the method and description of the program in ALGOL are given. A filtration structure applied to the correlation function has been included in the program to ensure obtaining reliable evaluations of the spectrum over a wide frequency range. Author

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

No abstracts in this category.

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N75-14358*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE PROCEEDINGS OF THE SKYLAB LIFE SCIENCES SYMPOSIUM, VOLUME 1
Richard S. Johnston and Lawrence F. Dietlein Nov. 1974 430 p refs Presented at Houston, Tex., 27-29 Aug. 1974 2 Vol.
(NASA-TM-X-58154-Vol-1; JSC-09275-Vol-1) Avail: NTIS HC $11.25 CSCL 06B

The three manned Skylab missions resulted in biomedical experiment data in the areas of neurophysiology, musculoskeletal physiology, biochemistry, hematology, cytology, cardiovascular and respiratory metabolic functions: as well as detailed test objectives involving crew health and environment procedures. Major emphasis was placed on results from the last mission, Skylab 4, which covered 84 days of in-flight data collection. Many new norms were defined for normal man living and operating in a unique environment. While man is quite adaptable to this unique environment, many of the changes observed in Skylab require additional research for future flights lasting very long periods of time such as a Mars mission requiring 18 months. For individual titles, see N75-14359 through N75-14380.

N75-14359* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB MEDICAL PROGRAM OVERVIEW **c52**
Richard S. Johnston *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 1-47 refs (For availability see N75-14358 05-51)
CSCL 06E

An overview is given of the Skylab medical program and its results. Areas discussed cover: (1) food systems; (2) waste management; (3) personal hygiene; (4) inflight medical support systems; (5) cardiovascular counterpressure garment; (6) life sciences experiments; (7) medical experiment altitude test; and (8) premission, in-flight, and postflight support. The medical program met or exceeded all of the planned objectives. The medical operations were conducted without any major problems, the medical equipment functioned flawlessly, and the medical data received from the crews were of excellent quality. A.L.

N75-14360* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FLIGHT CONTROL EXPERIENCES
F. Story Musgrave *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 43-46 (For availability see N75-14358 05-51)
CSCL 06B

An astronaut physician, Dr. Story Musgrave, discussed the biomedical aspects of mission control, and the management, direction, and support of in-flight biomedical activities. A.L.

N75-14361* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB 4 CREW OBSERVATIONS
Edward G. Gibson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 47-54 (For availability see N75-14358 05-51)
CSCL 06B

The scientist pilot on Skylab 4 Dr. Ed Gibson, briefly discussed the medical aspects of: food, exercise, scheduling, medical training, effects of fluid shift, and vestibular effects during the mission. A.L.

N75-14362* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB 2 CREW OBSERVATIONS AND SUMMARY
J. P. Kerwin *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 55-59 (For availability see N75-14358 05-51)
CSCL 06B

The first U.S. astronaut physician in space, Dr. Joe Kerwin, briefly discussed the signs, symptoms, and effects of weightlessness on crew performance and operations during the Skylab 2 mission. He concluded that man's potential efficiency in zero-g is as high as it is any place else. The degree to which this potential is realized is a function of the experience and training of the crew and of the degree to which their needs are met in flight. A.L.

N75-14363* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB CREW HEALTH - CREW SURGEONS' REPORTS **c52**
J. R. Hordinsky *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 61-73 (For availability see N75-14358 05-51)
CSCL 06E

A physician was designated as the Crew Surgeon for each of the three manned Skylab missions. He was responsible for the health of the Skylab crewmembers and their families, the development and use of the Inflight Medical Support System, the preflight medical examination and arrangement of all crew medical-related activities, and the postflight coordination of medical activity on board the recovery ship and afterwards at the NASA-Lyndon B. Johnson Space Center. From a clinical point of view, all of the physiological and psychological responses noted in the Skylab missions were either self-limiting or represented work-around problems requiring minimal counteraction. As such, these changes do not preclude extending man's duration in zero-gravity for longer periods of time. Author

N75-14364* Texas Univ., Houston.
SKYLAB ORAL HEALTH STUDIES **c52**
Lee R. Brown, William J. Frome (Air Force Dental Corps), Sandra Handler, Merrill G. Wheatcroft, and Linda J. Rider *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 75-97 refs (For availability see N75-14358 05-51)
CSCL 06E

Oral health considerations for the Skylab series of manned space flights included three areas of responsibility: clinical, provisions for in-flight care, and research. Clinically, prevention of dental disease was emphasized through frequent oral evaluations and an intensive home care program. During all missions provision was made for an extension of the crewmen's home care program and equipment and training were provided all astronauts for self-treatment in-flight should the need arise. Research was dedicated to the identification of potential oral health problems which might occur in prolonged space flights. Skylab crewmembers were monitored for: shifts in oral microbial populations, changes in the secretion of specific salivary components, and alterations in clinical indices of oral health and preexisting dental disease. Assuming no future clinical detection of mission-related intraoral complications, the most significant finding from these investigations was the relatively nonexistence of health-hazardous intraoral changes. Author

N75-14365* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANALYSIS OF THE SKYLAB FLIGHT CREW HEALTH STABILIZATION PROGRAM **c52**
J. K. Ferguson, G. W. McCollum, and B. L. Portnoy (Public Health Service, Atlanta) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 99-119 (For availability see N75-14358 05-51)
CSCL 06E

Throughout the Skylab Program, an extensive effort was made to reduce the probability of an illness occurrence in the flight crewmen. The Flight Crew Health Stabilization Program accomplished this objective by isolating the flight crew during preflight periods. In addition, the number of personal contacts with the crewmen was limited, and ill persons were not permitted to enter primary work areas. Initially, all persons who required contact with the flight crewmen during a 21-day period before flight were identified. Physical examinations and immunizations were given to the identified personnel. Voluntary reporting and active surveillance were used to detect illness occurrences and exposures to illness among the primary contact personnel. During the postflight period, the crewmen again were isolated and their contacts limited to medically approved personnel to reduce the occurrence of illness and to reintroduce the crewmen gradually

to the normal environment. The methods and procedures used in the program are presented, together with a descriptive analysis of the surveillance data. Author

N75-14366* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB ENVIRONMENTAL AND CREW MICROBIOLOGY STUDIES
R. M. Brockett (School of Aerospace Med.), J. K. Ferguson, R. C. Graves, T. O. Groves, M. R. Henney, C. J. Hodapp, K. D. Kropp, J. L. McQueen (Natl. Cancer Inst.), B. J. Mieszkuc, F. J. Pipes et al *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 121-143 refs (For availability see N75-14358 05-51)
CSCL 06M

The results of some ground-based simulations have engendered theories that forecasted microbial simplification, intercrew transfer of microbial pathogens, autoinfections, and postflight microbial shock. In an effort to understand the effects of space flight, microbiological samples from multiple sites on the crewmembers were collected several times before, during, and after the space flights. The Skylab are related to analogous Apollo data and are discussed in a manner that will allow an evaluation of the validity of the hypotheses presented. Additionally, in-flight environmental samples were acquired from designated sites within the spacecraft and returned to earth for analysis. The resulting data were used to identify potential microbial problems for the maintenance of a habitable environment in the orbital workshop. Author

N75-14367* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RADIOLOGICAL PROTECTION AND MEDICAL DOSIMETRY FOR THE SKYLAB CREWMEN c52
J. Vernon Bailey, R. A. Hoffman, and R. A. English *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 145-155 refs (For availability see N75-14358 05-51)
CSCL 06R

Dose equivalent radiation exposure of the Skylab crewmen has been maintained well below the limits recommended by the Radiobiological Advisory Panel, Committee on Space Medicine, National Academy of Sciences. Operational procedures and mission rules were established; ground support specialists were responsible for overall coordination and evaluation of data from Skylab onboard radiation-monitoring instruments, satellite monitoring systems, and solar observatory reports. Also, the Skylab crewmen were provided with instrumentation and training to enable autonomous response had a radiation problem arisen while the spacecraft was not within range of a ground communications site. A comparison among all Skylab crewmen of dose equivalents to skin, lens of the eye, and blood-forming organs is presented. Author

N75-14368* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
TOXICOLOGICAL ASPECTS OF THE SKYLAB PROGRAM c52
Wayland J. Rippstein, Jr. and Howard J. Schneider *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 157-168 refs (For availability see N75-14358 05-51)
CSCL 06T

A toxicology support capability for the Skylab Program was used to ensure a safe, habitable spacecraft environment for the crewmen. From previous experience with closed-loop environmental operations, it was known that trace-gas concentration buildup could cause mission-abort conditions. Therefore, the major toxicological consideration for the Skylab Program was to provide and maintain relatively low levels of contaminant gases in the spacecraft cabin atmosphere. To circumvent the possibility of the buildup of trace-gas levels, several preventive measures were taken. The most important measure was a screening test designed to eliminate materials that created serious outgassing problems. An atmospheric analysis of the completed Orbital Workshop was also made. Results of analyses indicated the presence of approximately 300 compounds in the Orbital Workshop atmosphere; 107 of these compounds were identified. It is important to note that had an effective trace-gas removal capability not been contained within the environmental control system of the spacecraft, the atmospheric contamination buildup in the crew compartment could have been a serious problem. Author

N75-14369* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EXPERIMENT M-131. HUMAN VESTIBULAR FUNCTION c53
Ashton Graybiel (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), Earl F. Miller, II (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), and J. L. Homick *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 169-220 refs (For availability see N75-14358 05-51) 4n
CSCL 06P

This experiment comprised three subtasks: (1) susceptibility to motion sickness; (2) thresholds for perception of angular acceleration as indicated by the oculogyral illusion; and (3) the perceived direction of internal and external space. Results of each of the subtasks are discussed in some detail. A.L.

N75-14370* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE EFFECTS OF PROLONGED EXPOSURE TO WEIGHTLESSNESS ON POSTURAL EQUILIBRIUM c52
J. L. Homick, M. F. Reschke, and E. F. Miller, II (Naval Aerospace Med. Res. Lab., Pensacola, Fla.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 221-238 refs (For availability see N75-14358 05-51)
CSCL 06P

Postural equilibrium performance by the Skylab 2, 3, and 4 crewmen following exposure to weightlessness was evaluated using a modified version of a quantitative ataxia test. The test employed a series of narrow metal rails of varying widths on which the crewman was required to maintain an upright posture with his feet tandemly aligned and arms folded across his chest. Performance for this test was measured under two sets of conditions. In the first the crewman was required to maintain postural equilibrium on the rail (or floor) with his eyes open. In the second condition he attempted to balance with his eyes closed. A comparison of the preflight and postflight data indicated moderate postflight decrements in postural equilibrium in three of the crewmen during the eyes open test condition. However, in the eyes closed condition, a considerable decrease in ability to maintain balance on the rails was observed postflight for all crewmen tested. The findings are explained in terms of functional alterations in the kinesthetic, touch, vestibular, and neuromuscular sensory mechanisms induced by the prolonged absence of a normal gravitational stimulus. Author

N75-14371* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB SLEEP MONITORING EXPERIMENT (M133) c53
James D. Frost, Jr. (Methodist Hospital), William H. Shumate, Joseph G. Salamy (Technology, Inc., Houston, Tex.), and Cletis R. Booher *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 239-285 refs (For availability see N75-14358 05-51)
CSCL 05E

The first objective measurements of man's ability to obtain adequate sleep during prolonged space flight were made during the three manned Skylab missions. Electroencephalographic, electro-oculographic, and head-motion signals were acquired during sleep by use of an elastic recording cap containing sponge electrodes and an attached miniature preamplifier/accelerometer unit. One subject was studied during each manned mission. In only the 28-day mission (Skylab 2) was there a significant decrease in total sleep time; in that case it was a result of voluntarily reduced rest time and was not due to difficulty in sleeping nor frequent awakening. Findings suggest that men are able to obtain adequate sleep in regularly scheduled eight-hour rest periods during extended space flights. It seems likely, based upon these results, that the problems encountered in earlier space flights did not arise from the zero-g environment per se, but possibly they were a result of more restricted living and working areas in the pre-Skylab spacecraft. Author

N75-14372* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VISUAL LIGHT FLASH OBSERVATIONS ON SKYLAB 4 c53

R. A. Hoffman, L. S. Pinsky (Tex. Univ., Houston), Z. Osborne (Tex. Univ., Houston), and J. V. Bailey *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 287-295 refs (For availability see N75-14358 05-51)
CSCL 06P

During the Skylab 4 mission, two separate light flash observation sessions were performed on mission days 74 and 81 by the pilot, William R. Pogue. These sessions occurred during orbits that allowed observations from high northern geomagnetic latitudes, through the equatorial region, and on to southern geomagnetic latitudes. The South Atlantic Anomaly was also traversed during each session. During each session, the pilot (in the sleep-restraint mode) donned a blindfold and recorded his observations of flashes on the voice recorder. The data obtained indicate a latitude effect on the frequency of the flashes; this effect would be expected if primary cosmic particles cause the flashes. Additionally, high flash rates (15 to 20 flashes/min) were observed when the spacecraft was over the center of the South Atlantic Anomaly. This observation has stimulated questions regarding the possible presence of trapped particles (larger than protons) in the South Atlantic Anomaly. Further observations and measurements regarding light flashes are planned for the Apollo-Soyuz Test Project. Author

N75-14373* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHANGES IN THE ACHILLES TENDON REFLEXES FOLLOWING SKYLAB MISSIONS **c52**
J. T. Baker (Technology, Inc., Houston, Tex.), A. E. Nicogossian, G. W. Hoffler, R. L. Johnson, and J. R. Hordinsky *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 297-305 refs (For availability see N75-14358 05-51)
CSCL 06P

A generalized hyperreflexia was clinically reported in the crew of the first manned Skylab mission. To assess possible neuromuscular alterations following extended space flight a decision was made to conduct duration measurements of the Achilles tendon reflex and its associated muscle potential. Reflex duration was measured from the initial stroke upon the tendon until all oscillations had ceased. The muscle potential interval for each reflex was measured from the initial tendon stroke to the point of greatest amplitude of the muscle potential spike. Crewmembers of Skylab 3 and 4 exhibited a significantly shortened reflex in the immediate postflight period. A compensatory prolongation of the reflex duration was exhibited between 4 and 12 days after recovery followed by a gradual return to the preflight values. In general, the muscle potential interval corresponded with the increase and decrease in the reflex duration. Author

N75-14374* National Aeronautics and Space Administration, Washington, D.C.
TASK AND WORK PERFORMANCE ON SKYLAB MISSION 2, 3 AND 4 (TIME AND MOTION STUDY - EXPERIMENT M151) **c54**
Joseph F. Kubis (Fordham Univ.), Edward J. McLaughlin, Rudolph Rusnak (Fordham Univ.), Gary H. McBride (Fordham Univ.), and Susan V. Saxon (Fordham Univ.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 307-399 (For availability see N75-14358 05-51)
CSCL 05E

This experiment was to study the effects of the Skylab environment on a variety of work tasks involving different types of activity. In-flight crewman performance, sampled over the duration of the mission, was compared with corresponding preflight training data in terms of efficiency and possible behavioral stress effects associated with length of exposure to the working and living conditions of the Skylab environment. The basic finding from this experiment was the uniformity of crew performance over the three missions. In general, crewmen adjusted rapidly to the weightless environment and became proficient in developing techniques to optimize task performance. Performance time varied with method change and with task and hardware configurations. The use of arms and legs (and the entire body) as subtle guidance and restraint systems facilitated the efficient translation and control of large and small masses, including the crewman himself. Differences in crew performance were not pronounced; variations in training procedure, the natural tempo and style of each crewman, and method changes were critical explanatory factors. Author

N75-14375* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW EFFICIENCY ON FIRST EXPOSURE TO ZERO-GRAVITY **c53**
Owen K. Garriott and Gary L. Doerre *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 341-352 refs (For availability see N75-14358 05-51)
CSCL 05E

The many individual work tasks accomplished by each of the three Skylab flight crews in their early activation phase have been identified and their respective performance times estimated. These work performances were compared both with preflight estimates of the rate at which work would be done and with crew output later in the mission when adaptation was complete and when the crewmembers were experienced in zero-gravity operations. The very substantial amount of work devoted to repair tasks during the early mission days was also included. It was found that on only two of the total of nine full or partial activation days was the crew work output significantly reduced. On the day of lowest efficiency, mission day 2 of the Skylab 3 mission, it appears that the crewmen were working at approximately 75 percent of their normal efficiency and may have lost approximately 7 man-hours of work. Overall, a nearly constant level of work was achieved on these activation days. However, as crew proficiency improved later in the missions, the daily crew work output in these same categories increased from approximately a 26 man-hour/day to at least a 34 man-hour/day. Author

N75-14376* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MINERAL AND NITROGEN METABOLIC STUDIES, EXPERIMENT M071 **c52**
G. Donald Whedon (NIH), Leo Lutwak (Calif. Univ. Los Angeles), Paul C. Rambaut, Michael W. Whittle, Malcolm C. Smith, Jeanne Reid (NIH), Carolyn S. Leach, Connie Rae Stadler (Technology, Inc., Houston, Tex.), and Deanna D. Sanford (Technology, Inc., Houston, Tex.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 353-371 refs (For availability see N75-14358 05-51)
CSCL 06P

Metabolic study of the effects of space flight on various chemical elements, particularly those with special relevance to the musculoskeleton system, was performed on the nine astronauts who participated in the three Skylab flights. In the Skylab experiment, increases in urinary calcium during space flight and in-flight changes in calcium balance were closely similar in degree to those found in bedrest immobilization. The similarity to bed rest in the pattern of urinary calcium increases and of total calcium shifts suggested that calcium losses would continue for a very long time. Significant losses on nitrogen and phosphorus occurred that were associated with observed reduction in muscle tissue. Both mineral and muscle losses occurred despite vigorous exercise regimens during flight. It was concluded that these studies give warning that capable musculoskeletal function may be significantly impaired during prolonged space flights lasting one and one-half to three years unless protective measures are developed. Author

N75-14377* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PHYSIOLOGICAL MASS MEASUREMENTS IN SKYLAB **c52**
William E. Thornton and J. Ord (Scott Air Force Base) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 373-386 (For availability see N75-14358 05-51)
CSCL 06P

One of the first changes noted in man following space flight was a loss in weight. To study the mechanism of such changes during flight, intake/output balance studies and measurements of crew mass were required. These measurements depended on the availability of nongravimetric mass-measurement devices. Such devices were flown and successful operation was demonstrated for the first time during Skylab missions. Electronically timed spring/mass oscillators were used to routinely determine all crew food residue and fecal masses to accuracies of a few grams.

Daily body mass measurements were made with errors of a small fraction of a pound. Two general patterns of body mass loss, usually mixed, were apparent. The first is a more or less continuous loss beginning before flight with an increase in rate of loss during flight. A second pattern is indicated by relative stability except for a small loss during the first few days of weightlessness with a reciprocal gain during the first few days after flight. Author

N75-14378* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BONE MINERAL MEASUREMENT - EXPERIMENT M078 c52
John M. Vogel (Calif. Univ., Davis) and M. W. Whittle *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 387-401 refs (For availability see N75-14358 05-51)
CSCL 06P

The probability of significant bone mineral loss being initiated by extended periods of weightlessness has been predicted on the basis of observations in bedrested and immobilized subjects. The mineral content of the distal right radius and ulna and the central left os calcis was measured preflight and postflight on the nine crewmen of the three Skylab manned missions using the photon absorptionmetric technique. No significant mineral losses were observed in any of the three Skylab 2 crewmen. Only the scientist pilot of Skylab 3 and scientist pilot and pilot of Skylab 4 had significant mineral losses in the os calcis. No losses in the radius and ulna were seen. The losses observed generally followed the loss patterns observed in a heterogeneous group of bedrested subjects. It is concluded that mineral losses do occur from the bones of the lower extremities during missions of up to 84 days and that in general, they follow the loss patterns of the bedrested situation. The levels of loss observed in the Skylab crews have been of no clinical concern but it was fortuitous that all of the Skylab 4 crewmen had high prediction terms. Author

N75-14379* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MUSCULAR DECONDITIONING AND ITS PREVENTION IN SPACE FLIGHT c52
William E. Thornton and J. A. Rummel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 403-416 (For availability see N75-14358 05-51)
CSCL 06P

Under weightlessness without countermeasures, a rapid disuse atrophy of weight-bearing muscular groups appears to occur. For the Skylab Program, such losses were measured with a constant speed (isokinetic) dynamometer. Ten maximum-effort, full-range flexion/extensions of the elbow and hip/knee at 45 degrees/second were recorded and evaluated for each crewman before and after flight. Anthropometric measurements allowed computation of volume changes of limb segments. Although weightlessness could cause rapid atrophy of many major muscle groups and disability on return to normal gravity could result after long missions, it has been demonstrated that such deconditioning can be prevented relatively easily through use of familiar exercise techniques. Future research efforts should focus on optimum methods of exercise with respect to crew time and crew acceptance, interrelationship of musculoskeletal fitness with cardiovascular fitness, and design of practical, efficient, total body exercisers. Author

N75-14380* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOSTEREOMETRIC ANALYSIS OF BODY FORM c52
Michael W. Whittle, Robin Herron (Tex. Inst. for Rehabilitation and Res., Houston), and Jaime Cuzzi (Tex. Inst. for Rehabilitation and Res., Houston) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 417-424 refs (For availability see N75-14358 05-51)
CSCL 06B

Stereophotogrammetry was used to derive the Cartesian coordinates of numerous points on the body surface of the Skylab crewmen, both before and after flight, on all three Skylab missions. Mathematical analysis of the coordinate description allows the computation of whole body surface area and volume, as well as the volume of body segments, and the area and shape of cross sections. Loss of body weight in the first two Skylab flight crews was accompanied by comparable loss of volume and little change in density. Volume loss was divided about equally between the trunk and the legs; however, because the volume of the legs is less than that of the trunk, this finding represented a greater proportional volume loss in the legs. Comparison of cross-sectional areas suggests that the calf undergoes shrinkage to a greater extent than does the thigh. The suggested interpretation of these changes is that during flight there was a reduction in body fluid, a partial muscle atrophy, particularly in the legs, and, in all but two of the crewmen, a loss of body fat. The partial muscle atrophy probably resulted from relative disuse in the absence of gravity, and was lessened to some extent by the in-flight exercise program. Author

N75-14381*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE PROCEEDINGS OF THE SKYLAB LIFE SCIENCES SYMPOSIUM, VOLUME 2
Richard S. Johnston and Lawrence F. Dietlein Nov. 1974 430 p refs Presented at Houston, Tex., 27-29 Aug. 1974 2 Vol.
(NASA-TM-X-58154-Vol-2; JSC-09275-Vol-2) Avail: NTIS HC $11.25 CSCL 06B

The three manned Skylab missions resulted in biomedical experiment data in the areas of neurophysiology, musculoskeletal physiology, biochemistry, hematology, cytology, cardiovascular and respiratory metabolic functions: as well as detailed test objectives involving crew health and environment procedures. Major emphasis was placed on results from the last mission, Skylab 4, which covered 84 days of in-flight data collection. Many new norms were defined for normal man living and operating in a unique environment. While man is quite adaptable to this unique environment, many of the changes observed in Skylab require additional research for future flights lasting very long periods of time such as a Mars mission requiring 18 months. For individual titles, see N75-14382 through N75-14399.

N75-14382* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMICAL RESPONSES OF THE SKYLAB CREWMAN c52
Carolyn S. Leach and Paul C. Rambaut *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 427-454 refs (For availability see N75-14381 05-51)
CSCL 06A

The biochemical investigations of the Skylab crewmen were designed to study the physiological changes that were observed on flight crews returning from previous space flight missions as well as to study those changes expected to result from prolonged weightless exposure. These studies can be divided into two broad categories. One category included routine blood studies similar to those used in clinical medical practice. The second included research-type endocrine analyses used to investigate more thoroughly the metabolic/endocrine responses to the space flight environment. The premission control values indicated that all Skylab crewmen were healthy and were free from biochemical abnormalities. The routine results during and after flight showed slight but significant changes in electrolytes, glucose, total protein, osmolality, uric acid, cholesterol, and creatinine. Plasma hormal changes included adrenocorticotrophic hormone, cortisol, angiotensin I, aldosterone, insulin, and thyroxine. The 24-hour urine analyses results revealed increased excretion of cortisol, catecholamines, antidiuretic hormone, and aldosterone as well as excretion of significant electrolyte and uric acid during the Skylab flights. Author

N75-14383* Texas Univ., Galveston. Medical Branch.
CYTOGENIC STUDIES OF BLOOD (EXPERIMENT M111) c52
Lillian H. Lockhart *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 455-465 refs (For availability see N75-14381 05-51)
CSCL 06E

The Skylab M111 experiment was a continuation of the preflight and postflight chromosomal analyses of the flight crews that have been performed since the Gemini 3 mission. The experiment was designed to determine whether some space flight

parameter produces cytogenetic effects in human cells and to provide biological radiation dosimetric capability in the event of significant radiation exposure to a flight crew. On each of the Skylab flights, blood lymphocytes for analysis of chromosomes for structural defects were obtained from each of the prime crewmembers and from a ground-based control group before and after flight. Two types of defects were recorded. The minor defects included the following aberrations: chromatid fragments, chromosome fragments, and deletions. Structural rearrangements such as dicentrics, exchanges, ring chromosomes, and translocazions were photographed, and the cells were karyotyped to delineate, when possible, the chromosome or chromosomes involved in the rearrangement. Result seems to indicate that the flight itself was not a major contributing factor. Author

N75-14384* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE RESPONSE OF SINGLE HUMAN CELLS TO ZERO GRAVITY **c52**
P. OB. Montgomery, Jr. (Woodlawn Hosp., Dallas), J. E. Cook (Woodlawn Hosp., Dallas), R. C. Reynolds (Texas Univ., Dallas), J. S. Paul (Woodlawn Hosp., Dallas), L. Hayflick (Stanford Univ., Palo Alto, Calif.), D. Stock (Texas Univ., Houston), W. W. Schulz (Woodlawn Hosp., Dallas), S. L. Kimzey, R. G. Thirolf, T. Rogers et al *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 467-491 refs (For availability see N75-14381 05-51)
CSCL 06B

The SO15 experiment was designed to extend observations of the effects of zero-gravity to living human cells during and subsequent to a 59-day flight on Skylab 3. A strain of diploid human embryonic lung cells, WI-38, was chosen for this purpose. The studies were concerned with observations designed to detect the effects of zero-gravity on cell growth rates and on cell structure as observed by light microscopy, transmission and scanning electron microscopy and histochemistry. Studies of the effects of zero-gravity on the cell function and the cell cycle were performed by time lapse motion picture photography and microspectrophotometry. Subsequent study of the returned living cells included karotyping, G- and C-banding, and analyses of the culture media used. Some of the living cells returned were banked by deep freeze techniques for possible future experiments. Author

N75-14385* Baylor Univ., Houston, Tex. Coll. of Medicine.
BLOOD VOLUME CHANGES **c52**
Philip C. Johnson, Theda B. Driscoll, and Adrian D. LeBlance *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 495-505 refs (For availability see N75-14381 05-51)
CSCL 06E

Analysis of radionuclide volume determinations made for the crewmembers of selected Gemini and Apollo missions showed that orbital spaceflight has an effect on red cell mass. Because the methods and the protocol developed for earlier flights were used for the crews of the three Skylab missions, direct comparisons are possible. After each Skylab mission, decreases were found in crewmembers' red cell masses. The mean red cell mass decrease of 11 percent or 232 milliliters was approximately equal to the 10 percent mean red cell mass decrease of the Apollo 14 to 17 crewmembers. The red cell mass drop was greatest and the postrecovery reticulocyte response least for crewmembers of the 28-day Skylab 2 mission. Analyses of data from the red cell mass determinations indicate that the red cell mass drops occurred in the first 30 days of flight and that a gradual recovery of the red cell mass deficits began approximately 60 days after launch. The beginning of red cell mass regeneration during the Skylab 4 flight may explain the higher postmission reticulocyte counts. Author

N75-14386* Missouri Univ., Columbia.
RED CELL METABOLISM STUDIES ON SKYLAB **c52**
Charles E. Mengel *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 507-518 refs (For availability see N75-14381 05-51)
CSCL 06P

On the basis of these background data, metabolic studies were performed on humans involved in space flight. These studies included the Skylab experiences. The primary purpose of the investigations was to study red cells for: (1) evidences of lipid peroxidation, or (2) changes at various points in the glycolytic pathway. The Skylab missions were an opportunity to study blood samples before, during, and after flight and to compare results with simultaneous controls. No direct evidence that lipid peroxidation had occurred in the red blood cells was apparent in the studies. Author

N75-14387* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EXPERIMENT M115: SPECIAL HEMATOLOGIC EFFECTS: DYNAMIC CHANGES IN RED CELL SHAPE IN RESPONSE TO THE SPACE-FLIGHT ENVIRONMENT **c52**
Stephen L. Kimzey, Linda C. Burns (Northrop Services, Inc., Houston, Tex.), and Craig L. Fischer (Eisenhower Memorial Hosp., Palm Desert, Calif.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 519-544 refs (For availability see N75-14381 05-51)
CSCL 06S

The significance of the transformations in red cell shape observed during the Skylab study must be considered relative to the limitation of man's participation in extended space flight missions. The results of this one study are not conclusive with respect to this question. Based on these examinations of red cells in normal, healthy men and based on other Skylab experiment data relative to the functional capacity of the red cells in vitro and the performance capacity of man as an integrated system, the changes observed would not appear to be the limiting factor in determining man's stay in space. However, the results of this experiment and the documented red cell mass loss during space flight raise serious questions at this time relative to the selection criteria utilized for passengers and crews of future space flights. Until the specific cause and impact of the red cell shape change on cell survival in vivo can be resolved, individuals with diagnosed hematologic abnormalities should not be considered as prime candidates for missions, especially those of longer duration. Author

N75-14388* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LOWER BODY NEGATIVE PRESSURE: THIRD MANNED SKYLAB MISSION **c52**
R. L. Johnson, G. W. Hoffler, A. E. Nicogossian, S. A. Bergman, and M. M. Jackson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 545-595 refs (For availability see N75-14381 05-51)
CSCL 06S

The crew of the Skylab 4 Mission exhibited physiological changes during their 84-day mission that resembled but in several important areas did not reach the magnitude of changes exhibited in crewmen of the two earlier Skylab flights. At rest all three crewmen showed, in comparison to preflight levels, elevated mean systolic and pulse pressures and decreased mean diastolic and mean arterial pressures. Similar changes were seen in most Skylab 2 and Skylab 3 crewmen. While mean resting heart rates of both the Skylab 3 and Skylab 4 crews were elevated, those of the Skylab 2 crew were, however, lower than during preflight tests. Stressed heart rates followed previous patterns in being consistently elevated over preflight values. Postflight changes in cardiovascular parameters for the most part resembled those seen in previous crewmen of space missions. Their recovery to preflight limits occurred rapidly. In-flight data and subjective impressions of the crewmen confirmed that lower body negative pressure in weightlessness imposed a greater stress upon the cardiovascular system than in earth's gravity. Author

N75-14389* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VECTORCARDIOGRAPHIC RESULTS FROM SKYLAB MEDICAL EXPERIMENT M092: LOWER BODY NEGATIVE PRESSURE **c52**
G. W. Hoffler, R. L. Johnson, A. E. Nicogossian, S. A. Bergman, and M. M. Jackson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 597-621 refs (For availability see N75-14381 05-51)
CSCL 06S

Vectorcardiograms were recorded via a modified Frank lead system from all crewmen of the three Skylab missions in conjuction

with the Lower Body Negative Pressure - M092 Experiment. Data were analyzed by a specially developed computer program (VECTAN). Design of the test sequences allowed direct comparisons of supine resting, Earth based (reference) vectorcardiograms with those taken during lower body negative pressure stress and those obtained at rest in orbit, as well as combinations of these conditions. Results revealed several statistically significant space flight related changes; namely, increased testing and lower body negative pressure stressed heart rates, modestly increased PR interval and corrected QTC interval, and greatly increased P and QPS loop maximal amplitudes. In addition, orientation changes in the QRS maximum vector and the J-vector at rest in space seem quite consistent among crewmen and different from those caused by the application of lower body negative pressure. No clinical abnormalities were observed. Etiology of these findings is conjectured to be, at least in part, related to fluid mass shifts occurring in weightlessness and attendant alterations in cardiovascular dynamics and myocardial autonomic control mechanisms.
Author

N75-14390* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEMODYNAMIC STUDIES OF THE LEGS UNDER WEIGHTLESSNESS c52
William E. Thornton and G. W. Hoffler *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 623-635 (For availability see N75-14381 05-51)
CSCL 06S

Following exposure to weightlessness, alterations in the return of blood from the legs play a crucial role in orthostatic tolerance and may be an important factor in work tolerance. To investigate some of the hemodynamic mechansism involved, an experiment was performed on the Skylab 3 and Skylab 4 missions to study arterial blood flow, venous compliance, and muscle pumping of blood. Skylab 4 results indicated that the most likely cause of increased blood flow was an increase in cardiac output secondary to increased central venous pressure caused by blood redistribution. Changes in venous compliance are thought to be primarily changes in somatic musculature which is postulated to primarily determine venous compliance of the legs. This was also thought to be demonstrated by the changes in muscle pumping. It is thought that these compliance changes, when taken with the decreased blood volume; provide a basis for the changes seen in orthostatic tolerance, work capacity and lower body negative pressure response.
Author

N75-14391* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTHROPOMETRIC CHANGES AND FLUID SHIFTS c52
William E. Thornton, G. W. Hoffler, and J. A. Rummel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 637-658 (For availability see N75-14381 05-51)
CSCL 06S

Several observations of body size, shape, posture, and configuration were made to document changes resulting from direct effects of weightlessness during the Skylab 4 mission. After the crewmen were placed in orbit, a number of anatomical and anthropometric changes occurred including a straightening of the thoracolumbar spine, a general decrease in truncal girth, and an increase in height. By the time of the earliest in-flight measurement on mission day 3, all crewmen had lost more than two liters of extravascular fluid from the calf and thigh. The puffy facies, the bird legs effect, the engorgement of upper body veins, and the reduced volume of lower body veins were all documented with photographs. Center-of-mass measurements confirmed a fluid shift cephalad. This shift remained throughout the mission until recovery, when a sharp reversal occurred; a major portion of the reversal was completed in a few hours. The anatomical changes are of considerable scientific interest and of import to the human factors design engineer, but the shifts of blood and extravascular fluid are of more consequence. It is hypothesized that the driving force for the fluid shift is the intrinsic and unopposed lower limb elasticity that forces venous blood and then other fluid cephalad.
Author

N75-14392* Vanderbilt Univ., Nashville, Tenn.
VECTORCARDIOGRAPHIC CHANGES DURING EXTENDED SPACE FLIGHT c52
Raphael F. Smith, Kevin Stanton (Naval Aerospace Med. Inst.), David Stoop (Naval Aerospace Med. Inst.), Donald Brown (Naval Aerospace Med. Inst.), Walter Janusz (Naval Aerospace Med. Inst.), and Paul King *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol 2 Nov. 1974 p 659-679 refs (For availability see N75-14381 05-51)
CSCL 06S

To assess the effects of space flight on cardiac electrical properties, vectorcardiograms were taken on the 9 Skylab astronauts during the flights of 28, 59, and 84 days. The Frank lead system was used and observations were made at rest; during 25%, 50% and 75% of maximum exercise; during a short pulse of exercise (150 watts, 2 minutes); and after exercise. Data from 131 in-flight tests were analyzed by computer and compared to preflight and postflight values. Statistically significant increase in QRS vector magnitude (six of nine crewmen); T vector magnitude (five of nine crewmen); and resting PR interval duration (six of nine crewmen) occurred. During exercise the PR interval did not differ from preflight. Exercise heart rates inflight were the same as preflight, but increased in the immediate postflight period. With the exception of the arrhythmias, no deleterious vectorcardiographic changes were observed during the Skylab missions.
Author

N75-14393* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF THE ELECTROMECHANICAL PROPERTIES OF THE CARDIOVASCULAR SYSTEM c52
Stuart A. Bergman, Jr., G. W. Hoffler, and R. L. Johnson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 681-709 refs (For availability see N75-14381 05-51)
CSCL 06S

Cardiovascular electromechanical measurements were collected on returning Skylab crewmembers at rest and during both lower body negative pressure and exercise stress testing. These data were compared with averaged responses from multiple preflight tests. Systolic time intervals and first heart sound amplitude changes were measured. Clinical cardiovascular examinations and clinical phonocardiograms were evaluated. All changes noted returned to normal within 30 days postflight so that the processes appear to be transient and self limited. The cardiovascular system seems to adapt quite readily to zero-g, and more importantly it is capable of readaptation to one-g after long duration space flight. Repeated exposures to zero-g also appear to have no detrimental effects on the cardiovascular system.
Author

N75-14394* National Institutes of Health, Bethesda, Md.
EFFECT OF PROLONGED SPACE FLIGHT ON CARDIAC FUNCTION AND DIMENSIONS c52
Walter L. Henry, Stephen E. Epstein, James M. Griffith, Robert E. Goldstein, and David R. Redwood *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 711-721 refs (For availability see N75-14381 05-51)
CSCL 06S

Echocardiographic studies were performed preflight 5 days before launch and on recovery day and 1, 2, 4, 11, 31 and 68 days postflight. From these echocardiograms measurements were made. From these primary measurements, left ventricular end-diastolic volume, end-systolic volume, stroke volume, and mass were derived using the accepted assumptions. Findings in the Scientist Pilot and Pilot resemble those seen in trained distance runners. Wall thickness measurements were normal in all three crewmembers preflight. Postflight basal studies were unchanged in the Commander on recovery day through 68 days postflight in both the Scientist Pilot and Pilot, however, the left ventricular end-diastolic volume, stroke volume, and mass were decreased slightly. Left ventricular function curves were constructed for the Commander and Pilot by plotting stroke volume versus end-diastolic volume. In both astronauts, preflight and postflight data fell on the same straight line demonstrating that no deterioration in cardiac function had occurred. These data indicate that the cardiovascular system adapts well to prolonged weightlessness and suggest that alterations in cardiac dimensions and function are unlikely to limit man's future in space.
Author

N75-14395* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

RESULTS OF SKYLAB MEDICAL EXPERIMENT M171: METABOLIC ACTIVITY c52

E. L. Michel, J. A. Rummel, C. F. Sawin, M. C. Buderer (Technology, Inc., Houston, Tex.), and J. D. Lem *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 723-762 refs (For availability see N75-14381 05-51)

CSCL 06S

The experiment was conducted to establish whether man's ability to perform mechanical work would be progressively altered as a result of exposure to the weightless environment of space flight. The Skylab crewmen exercised on a bicycle ergometer at workloads approximating 25, 50, and 75 percent of their maximum aerobic capacity. The physiological parameters monitored were respiratory gas exchange, blood pressure, and vectorcardiogram/heart rate. The results of these tests indicate that the crewmen had no significant decrement in their responses to exercise during their exposure to zero gravity. The results of the third manned Skylab mission (Skylab 4) are presented and a comparison is made of the overall results obtained from the three successively longer Skylab manned missions. The Skylab 4 crewmembers' 84-day in-flight responses to exercise were no worse and were probably better than the responses of the crewmen on the first two Skylab missions. Indications that exercise was an important contributing factor in maintaining this response are discussed.

Author

N75-14396* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

PULMONARY FUNCTION EVALUATION DURING AND FOLLOWING SKYLAB SPACE FLIGHTS c52

C. F. Sawin, A. E. Nicogossian, A. P. Schachter (Technology, Inc., Houston, Tex.), J. A. Rummel, and E. L. Michel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 763-774 refs (For availability see N75-14381 05-51)

CSCL 06E

Previous experience during the Apollo postflight exercise testing indicated no major changes in pulmonary function. Although pulmonary function has been studied in detail following exposure to hypoxic and hyperoxic environments, few studies have dealt with normoxic environments at reduced total pressure as encountered during the Skylab missions. Forced vital capacity was measured during the preflight and postflight periods of the Skylab 2 mission. Initial in-flight measurements of vital capacity were obtained during the last two weeks of the second manned mission (Skylab 3). Comprehensive pulmonary function screening was accomplished during the Skylab 4 mission. The primary measurements made during Skylab 4 testing included residual volume determination, closing volume, vital capacity, and forced vital capacity and its derivatives. In addition, comprehensive in-flight vital capacity measurements were made during the Skylab 4 mission. Vital capacity was decreased slightly during flight in all Skylab 4 crewmen. No major preflight to postflight changes were observed in the other parameters. Author

N75-14397* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METABOLIC COST OF EXTRAVEHICULAR ACTIVITIES c52

James M. Waligora and David J. Horrigan, Jr. *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 775-784 refs (For availability see N75-14381 05-51)

CSCL 06S

The data on metabolic rates during Skylab extravehicular activities are presented and compared with prior experience during Gemini and Apollo. Difficulties experienced with Gemini extravehicular activities are reviewed. The effect of a pressure suit on metabolic rate is discussed and the life support equipment capabilities of each life support system are reviewed. The methods used to measure metabolic rate, utilizing bioinstrumentation and operational data on the life support system, are described. Metabolic rates are correlated with different activities. Metabolic rates in Skylab were found to be within the capacities of the life support systems and to be similar to the metabolic rates experienced during Apollo lunar 1/6-g extravehicular activities. They were found to range from 100 kcal/h to 500 kcal/h, during both 1/6-g and zero-g extravehicular activities. The average metabolic rates measured during long extravehicular activities were remarkably consistent and appeared to be a function of crew pacing of activity rather than to the effort involved in individual tasks. Author

N75-14398* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

DETERMINATION OF CARDIAC SIZE FROM CHEST ROENTGENOGRAMS FOLLOWING SKYLAB MISSIONS c52

A. E. Nicogossian, G. W. Hoffler, R. L. Johnson, and R. J. Gowen (Air Force Academy) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 785-793 refs (For availability see N75-14381 05-51)

CSCL 06P

Decreased cardiothoracic transverse diameter ratios following Mercury, Gemini and Apollo space flights have been reported previously. To evaluate further changes in cardiac size, standard posteroanterior chest films in systole and diastole were obtained before flight and within a few hours after recovery on each of the Skylab astronauts. Postflight chest X-rays were visually compared to the preflight roentgenograms for possible changes in pulmonary vasculature, lung parenchyma, bony or soft tissue structures. From these roentgenograms the following measurements were obtained: cardiac and thoracic transverse diameters, cardiothoracic transverse diameter ratio, cardiac area from the product of both diagonal diameters, cardiac silhouette area by planimetry, thoracic cage area and cardiothoracic area ratio. The postflight frontal cardiac silhouette sizes were significantly decreased when compared with the respective preflight values ($P < 0.05$ or 0.01). The observed changes are thought to be related to postflight decrease in the intracardiac chamber volume. Author

N75-14399* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SKYLAB: A BEGINNING

Lawrence F. Dietlein *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 795-814 refs (For availability see N75-14381 05-51)

CSCL 06S

Skylab biomedical experience indicates that man adapts well to and functions effectively in the space environment for time periods approaching three months. Appropriate dietary intake coupled with adequate, programmed exercise, sleep, work and recreation periods are essential to crew health and well being. No untoward physiological responses have been noted that would preclude longer duration space flights, but more research is required in order to understand the mechanisms involved in the observed responses. Remedial or preventive measures may be required for Mars-type missions, and further study of man in earth orbit for an uninterrupted six-month period should ideally precede this Mars-type mission. Author

N75-14400# Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.

DETERMINATION OF AEROSOL MASS DISTRIBUTION IN AN AEROSOL CENTRIFUGE BY MEANS OF QUARTZ OSCILLATORS

F. J. Moenig, N. Schwarzer, and W. Stoeber 1973 8 p refs In GERMAN; ENGLISH summary Presented at 1st Meeting of Gesellsch. f. Aerosolforsch, Bad Soden, West Germany, 20 Oct. 1973 Sponsored by AEC Prepared in cooperation with Fraunhofer-Ges. zur Forderung der Angew. Forsch. E. V., Grafschaft, West Germany

(UR-3490-478; Conf-731080-1) Avail: NTIS HC $3.25

The function, design and performance tests of quartz oscillator circuits integrated in a spiral centrifuge type aerosol size spectrometer are described. The quartz oscillators are thin disks mounted flush to the deposition wall of the centrifuge collecting size-separated particles according to their deposit location in the duct. The shift on the oscillator frequency by the build-up of the deposit layer is related to the surface concentration of deposited mass. A deposit concentration of 0.00000001 grams/sq cm causes a frequency shift of 2.3 Hz. This is close to the optimum sensitivity of the prototype design because the oscillator frequency is also slightly dependent on thermal influences and humidity changes. Results with a fluorescein test aerosol are reported. Author

N75-14401# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
INVESTIGATION OF THE EFFECTS OF NOISE ON THE ENCODING FUNCTION OF A SYNCODER M.S. Thesis
John H. Miller Jun. 1974 89 p refs
(AD-785070; GE/EE/74-13) Avail: NTIS CSCL 06/4

A syncoder is an electronic model of a neuron (nerve cell). An approximate performance analysis under arbitrary additive noise conditions is developed. A computer program to provide graphical results is written and effects of varying parameters are discussed. Comparisons with studies of the noiseless syncoder are made. Author (GRA)

N75-14402# Svenska Institutet, Stockholm (Sweden).
ENVIRONMENTAL PLANNING IN SWEDEN: NUMBER 55: THE ABISKO RESEARCH STATION
Lars Emmelin Sep. 1974 8 p Submitted for publication
(PB-235794/5) Avail: NTIS HC $3.25 CSCL 06F

Work being done at the Abisko Research Station operated by the Royal Swedish Academy of Sciences in the extreme north of Sweden is summarized. The station has recently attracted attention as a potential member of the global environmental monitoring network. GRA

N75-14412* National Aeronautics and Space Administration, Washington, D.C.
CORRELATION CHANGES IN EEG, CONDITIONED AND BEHAVIORAL REACTIONS WITH VARIOUS DEGREES OF OXYGEN INSUFFICIENCY
N. A. Agadzhanyan, I. N. Zakharova, L. V. Kalyuzhnyy, I. I. Dvorzhak, M. Moravek, and Ya. I. Tsmiral *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 100-112 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 72-80 (For availability see N75-14404 05-52)
CSCL 06S

N75-14413* National Aeronautics and Space Administration, Washington, D.C.
STUDIES OF HYPOKINESIA IN ANIMALS TO SOLVE URGENT PROBLEMS OF SPACE BIOLOGY AND MEDICINE
S. Baranski, K. Bodya, V. Reklevska, L. Tomashevska, M. S. Gayevskaya, Ye. I. Ilina-Kakuyeva, G. Katsyuba-Ustiko, Ye. A. Kovalenko, L. M. Kurkina, E. S. Mailyan et al *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 113-140 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 81-94 (For availability see N75-14404 05-52)
CSCL 06S

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N75-14403*# Linguistic Systems, Inc., Cambridge, Mass.
INTRACYTOPLASMIC ULTRASTRUCTURES IN PERIPHERAL BLOOD CELLS IN LUPUS ERYTHEMATOSUS
Gudrun Metz and J. Metz Washington NASA Dec. 1974 20 p refs Transl. into ENGLISH from Arch. Dermatol. Forschung. (West Germany), v. 249, no. 1, 1974 p 35-43 and 46-50
(Contract NASw-2482)
(NASA-TT-F-15710) Avail: NTIS HC $3.25 CSCL 06E

Buffy coats of peripheral blood of different manifestations of lupus erythematosus were studied by electron microscopy for the existence of viruslike intracytoplasmic tubular structures. They could always be demonstrated in the blood leukocytes of systemic lupus erythematosus independent of duration, severity and prior medical treatment of the disease, but were completely absent in chronic discoid lupus erythematosus. So far these inclusions have been observed only in the active dermal lesions of the chronic lupus erythematosus whereas various organs involved in systemic lupus erythematosus contained these structures. Their appearence in blood cells can therefore be interpretated as an early signal of visceral manifestation of the illness, which clinically is yet undetectable. Author

N75-14404*# National Aeronautics and Space Administration, Washington, D.C.
THE FUNCTION OF THE BODY AND FACTORS OF SPACE FLIGHT
N. N. Gurovskiy, ed. 1974 342 p refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 1-227
(NASA-TT-F-15971) Avail: NTIS HC $9.50 CSCL 06S

Various aspects of artificial cabin atmospheres, human thermoregulation, hypodynamia, vestibular stability, and radiation safety during manned space flight are elaborated. For individual titles, see N75-14405 through N75-14429.

N75-14405* National Aeronautics and Space Administration, Washington, D.C.
COOPERATION BETWEEN SOCIALIST COUNTRIES IN SPACE BIOLOGY AND MEDICINE WITHIN THE FRAMEWORK OF THE INTERKOSMOS PROGRAM
N. N. Gurovskiy *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 1-19 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 6-18 (For availability see N75-14404 05-52)
CSCL 06S

Upon the proposal of the Soviet Union, experts from the socialist countries accepted the following scientific problems for cooperation in space biology and medicine: (1) the effect on the body of extreme space flight factors (space physiology); (2) radiation safety of space flights and search for pharmaco-chemical means of antiradiation protection; and (3) medico-biological aspects of closed ecological systems. Author

N75-14406* National Aeronautics and Space Administration, Washington, D.C.
THE PROBLEM OF HYPOXIA, HYPEROXIA AND HYPERCAPNIA IN SPACE PHYSIOLOGY
N. A. Agadzhanyan, P. M. Gramenitskiy, Ye. A. Kovalenko, I. I. Dvorzhak, M. Moravek, and L. Palash *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 20-41 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 19-33 (For availability see N75-14404 05-52)
CSCL 06S

The dynamics of basic functional systems and behavioral reactions depend on the oxygen regime of the human body when confined in pressurized compartments during space flight. Permissible concentrations of oxygen, carbon dioxide and other gases to avoid symptoms of hypoxia, hyperoxia and hypercapnia are discussed in relation to numerous human tolerance studies. G.G.

N75-14407* National Aeronautics and Space Administration, Washington, D.C.
THE INTERNAL NATURE OF FUNCTIONAL DISTURBANCES ARISING IN THE BODY UNDER THE EFFECT OF EXTREME FACTORS
P. M. Gramenitskiy, Ye. A. Kovalenko, I. I. Dvorzhak, M. M. Moravek, Ya. I. Tsmiral, K. Zlatarev, and K. Kh. Kunchev *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 41-49 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 34-37 (For availability see N75-14404 05-52)
CSCL 06S

Physiological factors in human tolerance and adaptation to pressurized cabin atmospheres during manned space flight are analyzed. It is shown that individuals display different degrees of functional changes and disturbances despite identical indices of compensation by the body of external factors. The significance of reactions at the cellular tissue level to factors of an altered gaseous environment is emphasized. G.G.

N75-14408* National Aeronautics and Space Administration, Washington, D.C.
INTERNAL THERMOTOPOGRAPHY AND SHIFTS IN

GENERAL THERMAL BALANCE IN MAN UNDER SPECIAL HEAT TRANSFER CONDITIONS

S. M. Gorodinskiy, P. M. Gramenitskiy, Ye. I. Kuznets, O. Ye. Ozerov, E. V. Yakovleva, P. Groza, S. Kozlovskiy, and Yu. Naremski *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 50-62 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 40-46 (For availability see N75-14404 05-52)

CSCL 06S

Thermal regulation for astronauts working in pressure suits in open space provides for protection by a system of artificial heat removal and compensation to counteract possible changes in the heat regulating function of the human body that occur under the complex effects of space flight conditions. Most important of these factors are prolonged weightlessness, prolonged limitation of motor activity, and possible deviations of microclimatic environmental parameters. G.G.

N75-14409* National Aeronautics and Space Administration, Washington, D.C.

TOLERANCE OF ACUTE HYPOXIA WHILE PERFORMING OPERATOR ACTIVITY AND AFTER A PROLONGED PERIOD UNDER ALTERED GAS ENVIRONMENT CONDITIONS

P. Bloshchinskiy, L. Golets, N. A. Agadzhanyan, and A. V. Sergiyenko *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 63-74 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 48-55 (For availability see N75-14404 05-52)

CSCL 06S

Human and animal studies on physiological factors in resistance to acute hypoxia are elaborated. Results show that tolerance of acute hypoxia depends on gas composition and temperature in a sealed cabin, on the length of the stay and motive regime, and on the kind of operator and professional activity. After preliminary adaptation to hypoxia, resistance of the body increases not only to insufficiency of oxygen in inspired air, but also to the effects of other extremum factors of manned space flight. G.G.

N75-14410* National Aeronautics and Space Administration, Washington, D.C.

ON THE CHARACTERISTICS OF CALORIC NYSTAGMUS IN HEALTHY PERSONS

D. Bodo, V. P. Baranova, E. I. Matsnev, and M. Ya. Yakovleva *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 74-79 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 56-58 (For availability see N75-14404 05-52)

CSCL 06S

The asymmetry of reflex activity of labyrinths and directional preponderance of the reaction were studied on healthy persons subjected to caloric tests. Calorization with hot water was accompanied by less pronounced reactions in all parameters of nystagmus than analogous indices at cold water stimulation. The symmetry of labyrinth function shifted to the right in individuals with greater activity of the left central vestibular formations, analogous to right handedness behavior. It is concluded that asymmetry of reflex nystagmus in healthy persons can be due to a certain preponderance of functional activity in structures of the left hemisphere of the brain. G.G.

N75-14411* National Aeronautics and Space Administration, Washington, D.C.

GAS EXCHANGE AND THE COAGULATION SYSTEM OF THE BLOOD DURING THE EFFECT ON THE BODY OF HIGH CONCENTRATIONS OF OXYGEN AND CARBON DIOXIDE

L. Palosh, N. A. Agadzhanyan, G. A. Davydov, B. K. Rybakov, and A. S. Sergiyenko *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 80-100 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 59-71 (For availability see N75-14404 05-52)

CSCL 06S

Maximum permissible concentrations of oxygen and carbon dioxide in a controlled atmosphere were determined by evaluating their effects on human gas exchange, blood coagulation, and tolerances to acute hypoxia, acceleration, and physical loads. It was found that functional disturbances depend on the concentration of respiratory gases and the length of stay in an altered atmosphere. By changing the atmospheric composition and by bringing the gaseous environment into accordance with the work and rest regimen and energy expenditures, the general reactivity of the body changes favorably. G.G.

N75-14412* National Aeronautics and Space Administration, Washington, D.C.

CORRELATION CHANGES IN EEG, CONDITIONED AND BEHAVIORAL REACTIONS WITH VARIOUS DEGREES OF OXYGEN INSUFFICIENCY c51

N. A. Agadzhanyan, I. N. Zakharova, L. V. Kalyuzhnyy, I. I. Dvorzhak, M. Moravek, and Ya. I. Tsmiral *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 100-112 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 72-80 (For availability see N75-14404 05-52)

CSCL 06S

The dynamics of change in bioelectric activity of the brain during acute hypoxia are studied for the time that working capacity and active consciousness are preserved, and to establish the correlation between EEG changes and behavioral reactions under oxygen starvation. Changes in body functions and behavioral disturbances are related to the degree of oxygen saturation in the blood, to bioelectric activity of the brain, and to an increase in conditioned reflexes. The capacity for adequate reaction to external signals and for coordinated psychomotor activity after loss of consciousness returns to man after 30 seconds. Repeated effects of hypoxia produce changes in the physiological reactions of the body directed toward better adaptation to changing gaseous environments. G.G.

N75-14413* National Aeronautics and Space Administration, Washington, D.C.

STUDIES OF HYPOKINESIA IN ANIMALS TO SOLVE URGENT PROBLEMS OF SPACE BIOLOGY AND MEDICINE c51

S. Baranski, K. Bodya, V. Reklevska, L. Tomashevska, M. S. Gayevskaya, Ye. I. Ilina-Kakuyeva, G. Katsyuba-Ustiko, Ye. A. Kovalenko, L. M. Kurkina, E. S. Mailyan et al *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 113-140 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 81-94 (For availability see N75-14404 05-52)

CSCL 06S

The effects of hypokinesia on animals were studied by observing: (1) hormonal and mediator balance of the body; (2) gas exchange and tissue respiration; (3) protein content in skeletal muscles; (4) structure of skeletal muscles; and (5) function of skeletal muscles. Sharp limitation of motor activity causes interconnected processes of a dystropic and pathological character expressed as a reduction in the force of various muscle group with disturbance of velocity properties and motor coordination due to disturbances in the control link of the neuromuscular system. G.G.

N75-14414* National Aeronautics and Space Administration, Washington, D.C.

JUSTIFICATION OF PERMISSIBLE DOSES OF RADIATION DURING PROLONGED SPACE FLIGHTS

Yu. G. Grigoryev, Kh. Abel, V. Varteres, N. Nilolov, Z. Karpfel, and M. Prislichka *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 141-145 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 96-99 (For availability see N75-14404 05-52)

CSCL 06R

Maximum permissible radiation doses for astronauts are reported based on chronic radiation experiments with dogs and actual measurements during space flights. Observed were clinical conditions, peripheral blood and marrow, the state of the cardiovascular system, higher nervous activity, the state of the vestibular analyzer, the organ of vision, spermatogenic function and the ability to reproduce, the state of immunity and a number

of biological indices in blood and tissues. The following maximum permissible doses are determined as preliminary values: 1 year of flight - 200 rem; 2 years of flight - 250 rem; 3 years of flight - 275 rem. G.G.

N75-14415* National Aeronautics and Space Administration, Washington, D.C.

STUDY OF A NUMBER OF BIOCHEMICAL INDICES OF THE BLOOD AND TISSUE OF DOGS AFTER PROLONGED GAMMA-RADIATION

I. Alers, E. Alersova, T. Praslichka, E. Mishurova, A. Sedlakova, Zh. Malatova, A. A. Akhunov, and B. A. Markelov *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 145-151 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 100-104 (For availability see N75-14404 05-52)

CSCL 06R

The glucose content in blood and the lipid content in serum and tissues of dogs exposed to chronic radiation for 3 and 5 years were studied. In tissues of these animals, the concentration of soluble DNA and DNA contained in DNP was studied in the spleen, lymph node (deep cervical node) and bone marrow of thigh bones. Results indicate that chronic gamma irradiation significantly changes concentrations of glucose in the blood, and that of several lipids in serum and tissues. A reduction in the concentration of DNP in tested organs reflects changes in the relative number of cells with various nuclear cytoplasmic ratios; most pronounced changes in biochemical indices occure in dogs exposed to chronic gamma radiation in doses of 125 rad per year. G.G.

N75-14416* National Aeronautics and Space Administration, Washington, D.C.

A STUDY OF IMMUNOLOGICAL REACTIONS IN DOGS EXPOSED TO PROLONGED CHRONIC RADIATION

I. V. Konstantinova, Yu. G. Grigoryev, B. A. Markelov, A. S. Skryabin, V. M. Zemskov, I. S. Vasilyev, Yu. K. Veysfeyler, and I. Iokai *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 152-162 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 104-111 (For availability see N75-14404 05-52)

CSCL 06R

Immunomorphological studies on dog tissues exposed to long term gamma irradiation show that the number of cells containing antibodies increased and that the blast transformation reaction was activated. Prolonged radiation did not cause a reliable change in the synthesis of nucleic acids in spleen cells. G.G.

N75-14417* National Aeronautics and Space Administration, Washington, D.C.

RADIOBIOLOGICAL EFFECTS OF HEAVY IONS AND PROTONS

N. I. Ryzhov, S. V. Vorozhtsova, Ye. A. Krasavin, T. Ye. Mashinskaya, N. Ya. Savchenko, B. S. Fedorov, V. F. Khlanonina, V. N. Shelegedin, L. Gut, L. Sabo et al *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 163-173 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 112-118 (For availability see N75-14404 05-52)

CSCL 06R

Radiobiological effects of heavy ions and protons are studied on cells of mammals, bacteria, viruses and DNA of bacteria. Results show that the dose effect dependence bears an exponential character; the reduction of RBE as LET of particle increases reflects the different character of microdistribution of absorbed energy in biological objects with different levels of biological organization. G.G.

N75-14418* National Aeronautics and Space Administration, Washington, D.C.

THE EFFECT OF SYNTHETIC HOMOPOLYMER POLY I:C ON THE SYNTHESIS OF NUCLEIC ACIDS, PROTEIN AND INTERFERON IN SPLEEN CELLS NORMALLY AND WITH RADIATION

Ye. N. Antropova, I. V. Konstantinova, B. B. Fuks, M. Ya. Talosh, and Yu. K. Veysfeyler *In its* The Function of the Body and Factors of Space Flight (NASA-TT-C-15971) 1974 p 174-184 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 119-125 (For availability see N75-14404 05-52)

CSCL 06P

A comparative study is reported of the effect of the synthetic homopolymer poly I:C and Newcastle Disease virus on the synthesis of RNA, DNA, total protein and interferon in the spleen of nonradiated and radiated mice. In radiated animals, poly I:C and NDV had no stimulating effect on the synthesis of RNA; administration of both inducers to radiated mice did not significantly affect the content of lymphoid cellular elements in the spleen. However, while reduction of RNA synthesis, caused by radiation, also increases slightly under the effect of poly I:C and the virus, the synthesis of interferon in spleen cells and in the entire body is activated. G.G.

N75-14419* National Aeronautics and Space Administration, Washington, D.C.

INDIVIDUAL RADIOSENSITIVITY AND ITS DAILY VARIATIONS

Yu. N. Druzhinin, Yu. G. Grigoryev, G. N. Podluzhnaya, and M. Pospishil *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 185-193 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 126-130 (For availability see N75-14404 05-52)

CSCL 05R

The effectiveness of determining individual radiosensitivity of rats by total gas exchange measurements, studies of Na/K content in urine, and the reaction of leukocytes to intra-abdominal administration of epinephrine, was studied. The most indicative results of predicting individual reaction to radiation were obtained by the leukocyte reaction to epinephrine load; however, changes in the leukocyte content of peripheral blood after epinephrine administration depended on the initial level during the day. G.G.

N75-14420* National Aeronautics and Space Administration, Washington, D.C.

DAILY RHYTHMS OF RADIOSENSITIVITY OF ANIMALS AND SEVERAL DETERMINING CAUSES

Yu. P. Druzhinin, T. S. Malyutina, V. M. Seraya, G. P. Rodina, A. Vatsek, and A. Rakova *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 193-203 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 131-139 (For availability see N75-14404 05-52)

CSCL 06R

Daily rhythms of radiosensitivity in rats and mice were determined by survival rates after acute total radiation at the same dosage at different times of the day. Radiosensitivity differed in animals of different species and varieties. Inbred mice exhibited one or two increases in radiosensitivity during the dark, active period of the day. These effects were attributed to periodic changes in the state of stem hematopoietic cells. G.G.

N75-14421* National Aeronautics and Space Administration, Washington, D.C.

THE TEMPORAL ORGANIZATION OF PROCESSES OF CELL REPRODUCTION AND ITS CONNECTION WITH RHYTHMS OF RADIOSENSITIVITY OF THE BODY

Yu. P. Druzhinin, Yu. A. Romanov, and A. Vatsek *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 203-215 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 139-147 (For availability see N75-14404 05-52)

CSCL 06R

Radiosensitivity of individual phases of the mitotic cycle was studied in synchronous cell cultures and in several biological objects. It was found that radiosensitivity changed essentially according to phases of the mitotic cycle, depending on the kind of cells, evaluation criteria and the radiation dosage. Tests on partially synchronized HeLa cell populations, according to the criterion of survival, showed them most sensitive during mitosis, as well as in later G sub 1- or early DNA-synthesizing stages. With radiation in doses of 300 rad, the proportion of surviving cells showed a sensitivity directly before DNA synthesis of

approximately 4 times higher than the later S-phase and during the major portion of G sub 1- and G sub 2-periods. Sensitivity of cells in mitosis was approximately 3 times higher than in late G sub 1- and early S-phases. Author

N75-14422* National Aeronautics and Space Administration, Washington, D.C.

DEVELOPMENT AND CREATION OF CONDITIONS FOR THE RADIATION OF BIOLOGICAL OBJECTS WITH HIGH ENERGY PROTONS

V. P. Popov, A. I. Portman, M. A. Sychkov, A. V. Kolodkin, and I. Nikl *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 216-226 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 148-155 (For availability see N75-14404 05-52)

CSCL 06R

Depth distribution of an absorbed proton radiation dose was studied by both calculation and experimental methods on a cylindrical, homogeneous plexiglass phantom that represented the geometric form of a dog. The basis of the heterogeneous phantom was the natural skeleton of a dog, muscle tissue was simulated by a mixture of paraffin and silica filler, and lung tissue by gelatine capsules. Author

N75-14423* National Aeronautics and Space Administration, Washington, D.C.

PHYSICAL CONDITIONS FOR CONDUCTING RADIOBIOLOGICAL EXPERIMENTS IN BEAMS OF ACCELERATED PARTICLES WITH HIGH LINEAR ENERGY TRANSFER

Ye. I. Kudryashov, A. M. Marennyy, V. I. Popov, K. Aykhorn, and G. Ertsgreber *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 226-236 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 155-161 (For availability see N75-14404 05-52)

CSCL 06R

The design and construction of an accelerator to conduct radiobiological experiments is reported that uses aluminum filters to control the accelerated ion beam while preserving its stability, and a vacuum chamber to conduct the ion beam with the help of a collector through a lavsan exit port to the target. Depth distribution of the absorbed dose from a monodirectional ion beam is practically completely represented by the change in the energy spectrum of the biological object. G.G.

N75-14424* National Aeronautics and Space Administration, Washington, D.C.

ISOTOPE ALPHA IRRADIATORS FOR RADIOBIOLOGICAL RESEARCH

V. Drasher, Ye. I. Dudryashov, O. M. Meshcheryakova, and A. M. Marennyy *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 236-246 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 162-170 (For availability see N75-14404 05-52)

CSCL 06R

Radiation absorption is considered for the case where the isotopic alpha source, in the form of a flat disk, and the axially located biological object, also in the form of a flat disk, are separated by a layer of gas. Frequently the biological object is covered by a polymer film with minimal thickness for protection against radioactive contaminants. The energy of the alpha particle is calculated at the place where the absorbed dose is determined, taking into account loss of energy in air, film and tissue. The level of energy is determined by the specific loss in energy of the alpha particle arriving from the point source to a point at the biological subject. G.G.

N75-14425* National Aeronautics and Space Administration, Washington, D.C.

MICRODOSIMETRY AND THE RADIATION DANGER OF COSMIC RAYS

K. Gunter, V. Schultz, A. T. Gubin, Ye. Ye. Kovalev, and V. A. Sakovich *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 247-258 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 170-177 (For availability see N75-14404 05-52)

CSCL 06R

The radiation danger of space flights is due primarily to intensive proton fluxes accompanying solar flares and heavy multiple charged ions in galactic cosmic radiation. Evaluation of the biological effect of these kinds of rays is based on calculations of tissue dose, taking into account the formation of secondary radiation in shielding and tissue. The essential role in such calculations is played by the dependence of the factor of quality on linear energy transfer (LET) of these charged particles. Recommendations concerning the dependence of the quality factor on LET are based on radiobiological experiments carried out on many biological systems using various kinds of rays, including heavy ions with energies in the 1-10 Mev/nucleon range. Justification of the results of these experiments, as well as their extrapolation to other energies, requires development of a model description of the radiation effect of charged particles on biological microstructures. Author

N75-14426* National Aeronautics and Space Administration, Washington, D.C.

METHODOLOGICAL QUESTIONS OF CREATING TISSUE-EQUIVALENT PHANTOMS

A. V. Kolodkin, V. I. Popov, M. A. Sychkov, I. Nikl, M. Erdei, and O. Eyben *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 258-272 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 178-185 (For availability see N75-14404 05-52)

CSCL 06R

On the basis of analysis and generalization of literature data, the composition of tissue equivalent plastic was justified, parameters of a standard man were determined, plaster and metal forms were created for casting dummies, and an experimental model was produced from tissue equivalent material. Author

N75-14427* National Aeronautics and Space Administration, Washington, D.C.

PATHOGENETIC VALIDATION OF THE USE OF BIOLOGICAL PROTECTIVE AGENTS AND EARLY TREATMENT IN CASES OF RADIATION INJURY SIMULATING RADIATION EFFECTS UNDER SPACE FLIGHT CONDITIONS

V. D. Rogozkin, V. Varteres, L. Sabo, N. Groza, and I. Nikolov *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 273-296 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 186-202 (For availability see N75-14404 05-52)

In considering a radiation safety system for space flights, the various measures to protect man against radiation include drug prophylaxis. At the present time a great deal of experimental material has been accumulated on the prevention and treatment of radiation injuries. Antiradiation effectiveness has been established for sulfur- and nitrogen-containing substances, auxins, cyanides, polynucleotides, mucopolysaccharides, lipopolysaccharides, aminosaccharides, synthetic polymers, vitamins, hormones, amino acids and other compounds which can be divided into two basic groups - biological and chemical protective agents. Author

N75-14428* National Aeronautics and Space Administration, Washington, D.C.

THE BIOLOGICAL EFFECT OF PROLONGED RADIATION AND WAYS OF SELECTING NEW ANTI-RADIATION DRUGS EFFECTIVE IN THIS KIND OF RADIATION INJURY

V. D. Rogozkin, K. S. Chertkov, and I. Nikolov *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 296-309 Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 202-211 (For availability see N75-14404 05-52)

CSCL 06R

The basic characteristics of prolonged radiation - increased tolerance of radiation injury - are attributed to cellular kinetics; as dose rate is reduced, the population rate is not disturbed, particularly that of stem cells which makes it possible for the organism to tolerate higher radiation loads. It is concluded that this effect makes approved radio protectors, whose effect contains

an established cytostatic component, unsuitable for prolonged radiation. It is better to correct the stem pool formation process by either accelerating the proliferation of cells or limiting the effect of stimuli causing cells to lose colony forming properties.
Author

N75-14429* National Aeronautics and Space Administration, Washington, D.C.
EXPERIMENTAL-CLINICAL VALIDATION OF THE USE OF AMITETRAVIT, ATP AND AUTOLOGOUS BONE MARROW IN RADIATION INJURIES CAUSED BY PROLONGED RADIATION
O. M. Atamanova, L. M. Vodyakova, N. I. Gvozdeva, S. A. Davydova, L. P. Ignasheva, V. D. Rogozkin, M. F. Sbitneva, L. M. Ostroumova, M. V. Tikhomirova, A. G. Fedotenkov et al *In its* The Function of the Body and Factors of Space Flight (NASA-TT-F-15971) 1974 p 310-334 refs Transl. into ENGLISH from the book "Funktsiya Organizma i Faktory Kosmicheskogo Poleta" Moscow, Meditsina Press, 1974 p 211-226 (For availability see N75-14404 05-52)
CSCL 06R

Experimental clinical studies show that early pathogenetic treatment against the effects of prolonged radiation includes amitetravit as a means of increasing natural radio resistance, ATP as protective therapeutic agent, and automyelotransplantation for early pathogenetic treatment. The high effectiveness of the combined use of ATP and amitetravit in tests on dogs indicates an ability to prevent primary damages to genetic structures and accelerated processes of reparation in the first stages of radiopathological processes. G.G.

N75-14430# California Univ., San Francisco.
ECOLOGICAL FACTORS INVOLVED IN MAINTAINING THE BIOZA OF THE ANTERIOR NARES OF MAN, 1968 - 1974 Final Report
Howard I. Maibach and Raza Aly 1974 11 p refs
(Grant NGR-05-025-008)
(NASA-CR-141248) Avail: NTIS HC $3.25 CSCL 06E

Several experiments were conducted to determine the types, quantities, and interactions of the organisms present in human nasal passages. Emphasis was placed on factors influencing the growth and persistence of staphylococcus in carriers and non-carriers. Results of the various experiments point to the following conclusions: (1) no difference in the nasal bacterial ecology allowing differentiation of carriers from non-carries was observed; (2) experimental infection of embryonated eggs has demonstrated that prior allantoic infection with viridans streptococci affords significant protection against subsequent challenge with virulent staphylococci; (3) S. aureus, S. pyogenes, and C. albicans are sensitive to the antimicrobial effect of skin surface lipids; and (4) not all individuals have the ability to destroy S. aureus on the skin. N.E.R.

N75-14431*# Public Health Service Hospital, San Francisco, Calif.
PREVENTION OF BONE MINERAL CHANGES INDUCED BY BED REST: MODIFICATION BY STATIC COMPRESSION SIMULATING WEIGHT BEARING, COMBINED SUPPLEMENTATION OF ORAL CALCIUM AND PHOSPHATE, CALCITONIN INJECTIONS, OSCILLATING COMPRESSION, THE ORAL DIOPHOSPHONATEDISODIUM ETIDRONATE, AND LOWER BODY NEGATIVE PRESSURE Final Report
Victor S. Schneider, Stephen B. Hulley, Charles L. Donaldson, John M. Vogel, Sheldon N. Rosen, David A. Hantman, Darrell R. Lockwood, Derald Seid, Kenneth H. Hyatt, and Lester B. Jacobson [1974] 55 p refs
(NASA Order T-81070)
(NASA-CR-141453) Avail: NTIS HC $4.25 CSCL 06E

The phenomenon of calcium loss during bed rest was found to be analogous to the loss of bone material which occurs in the hypogravic environment of space flight. Ways of preventing this occurrence are investigated. A group of healthy adult males underwent 24-30 weeks of continuous bed rest. Some of them were given an exercise program designed to resemble normal ambulatory activity; another subgroup was fed supplemental potassium phosphate. The results from a 12-week period of treatment were compared with those untreated bed rest periods. The potassium phosphate supplements prevented the hypercalciuria of bed rest, but fecal calcium tended to increase. The exercise program did not diminish the negative calcium balance. Neither treatment affected the heavy loss of mineral from the calcaneus. Several additional studies are developed to examine the problem further. N.E.R.

N75-14432# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
FURTHER STUDIES ON THE THERAPY OF ORGANOPHOSPHOROUS ANTICHOLINESTERASE INTOXICATION WITH VERATRINIC COMPOUNDS. THE ROLE OF CALCIUM
Victor J. Nickolson, Herma J. Clason-vanderWiel, and Otto L. Wolthuis 1974 27 p refs
(MBL-1974-17; TDCK-64560) Avail: NTIS HC $3.75

Experiments were carried out to investigate the role of calcium in soman intoxication with 9-anthroic acid (ANCA), a compound with veratrine-like pharmacological properties. The effects of ANGA on respiratory paralysis and on the calcium content of the blood and hind leg muscles were determined in anaesthetized, atropinized rats. The respiratory paralysis which occurs within a few minutes after soman injection can be delayed about 2.5 hours by treatment with ANCA. However it is concluded that this therapy falls short of completely preventing respiratory failure since ANCA causes an accumulation of calcium in the stimulated muscles of soman poisoned animals. ESRO

N75-14433# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).
PITFALLS IN DETERMINATION OF ACETYLCHOLINE FROM BRAIN BY PYROLYSIS. GASCHROMATOGRAPHY/MASS SPECTROMETRY
R. L. Polak and P. C. Molenaar 1974 13 p refs Partly in ENGLISH and partly in DUTCH
(MBL-1974-18; TDCK-64633) Avail: NTIS HC $3.25

Gas chromatographic determination of acetylcholine (ACh) requires prior volatilization which can be achieved by demethylation of the quaternary N-atom with sodium benzenethiolate or by pyrolysis of a halide salt of ACh. During pyrolysis the halogen atom combines with a CH3-group which then leaves the N-atom. Experiments show that demethylation by pyrolysis is also suitable for the simultaneous determination of deuterium labelled variants of ACh by means of gas chromatography mass spectrometry. However, care must be taken that the samples do not contain appreciable amounts of choline, since exchange of deuterium labelled groups between ACh and choline during pyrolysis may yield erroneous results. Author (ESRO)

N75-14434# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
LIGHT PROFILES OF THE FOVEAL IMAGE OF A POINT SOURCE
J. J. Vos, J. Walraven, and A. VanMeeteren 1974 14 p refs
(Contract A72/KL/057)
(IZF-1974-22; TDCK-65254) Avail: NTIS HC $3.25

Intensity profiles are given, for various pupil sizes, for the foveal image of a white point source from the very image center to point far from it. These profiles were constructed from fundus reflectometric data on the point spread function below 5 min of arc, from glare studies on entoptic straylight beyond 1 deg, and from data on straylight artifacts in color induction in the region between. The results were also expressed in terms of the effective size of the foveal image and of the cornea to retina concentration factor. The latter quantity is often used in studies on laser damage. Author (ESRO)

N75-14435# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE ACTION SPECTRUM FOR RETINAL BURN: A LITERATURE COMPILATION
J. J. Vos 1974 14 p refs
(Contract A72/KL/057)
(IZF-1974-23; TDCK-65266) Avail: NTIS HC $3.25

The action spectrum for retinal burn is determined by the spectral transmittance of the ocular media and the spectral absorptance of the pigment layers of the fundus. Data on both components were collected from literature, and the resulting action spectrum is presented in tabular form. It is concluded

that incandescent light remains below the danger limit up to 100 million troland retinal illumination. From these data the susceptibility of the retina to damage from laser radiation can be predicted. ESRO

N75-14436# Physics Lab. RVO-TNO, The Hague (Netherlands).
MEASUREMENT OF THE SPECTRAL IRRADIANCE OF AN ULTRAVIOLET HANDLAMP [METING VAN DE SPECTRALE BESTRALINGSSTERKTE VAN EEN ULTRA-VIOLET HANDLAMP]
M. Deutekom and J. vanSchie Aug. 1974 8 p In DUTCH; ENGLISH summary
(PhL-1974-26; TDCK-65201) Avail: NTIS HC $3.25

In order to assess whether eye irritation can be caused by using an ultraviolet handlamp to irradiate objects at a distance of 25 cm to observe fluorescence, the spectral irradiance was measured at this distance. The results of the measurement in the ultraviolet wavelength region are presented. The irradiance produced by the lamp is fairly high, and thus leads to the introduction of precautions. ESRO

N75-14437# Von Karman Inst. for Fluid Dynamics, Rhode-Saint-Genese (Belgium).
ON THE FLUID DYNAMICS OF PROSTHETIC HEART VALVE FLOW: A PRELIMINARY NUMERICAL AND EXPERIMENTAL STUDY
Thomas J. Mueller (Notre Dame Univ.) Jun. 1974 35 p refs Sponsored in part by Indiana Heart Assoc., Notre Dame Univ., and Minna-James-Heineman Stifting
(VKI-TN-101) Avail: NTIS HC $3.75

The results of a numerical and experimental investigation of the steady flow through a fully open disk-type prosthetic heart valve in a circular tube are presented. While it appears that for this simple geometry the numerical approach offers important advantages over laboratory experiments at low Reynolds numbers, great care must be exercised in the choice of the numerical method. Furthermore, it is suggested that both numerical and laboratory experiments be performed as a check on each other. Author (ESRO)

N75-14438# Pennsylvania State Univ., University Park. Center for Air Environment Studies.
INFLUENCE OF ALTERED GASEOUS ENVIRONMENTS ON LUNG METABOLISM Final Progress Report, 1 Jun. 1973 - 31 May 1974
Rodney A. Rhoades Jul. 1974 31 p refs
(Grant AF-AFOSR-2559-73; AF Proj. 9777)
(AD-784908; CAES-Pub-374-74; AFOSR-74-1296TR) Avail: NTIS CSCL 06/19

Studies with isolated perfused rat lungs ventilated for 1.5 hr. at different oxygen tensions indicate that: Lactate production is inversely related to oxygen tension being significantly decreased with hyperoxia and significantly increased with hypoxia. Pyruvate production was not markedly affected with hypoxia. Glucose uptake is stimulated slightly with hypoxia, but the increase is not significant at the 5% level. Both glucose and palmitate utilization assessed by incorporation into total lipids, neutral lipids, phospholipids, PL - fatty acids, PL - glyceride glycerol, and oxidation to 14CO2 was not significantly altered by acute hypoxic stress. Pulmonary pressure showed a significant 31% increase during acute hypoxia; however, the presence of pulmonary edema was minimal. Acute hypoxic stress did not significantly affect lung glycogen content. Exposure to hypoxia for 24 hours, on the other hand, had a profound influence on the lung. Lactate production showed a significant 80% increase with the lactate-pyruvate ratio showing a 40% increase. Pyruvate production also showed a marked increase. Glucose uptake was significantly stimulated with 24 hour hypoxia. Glucose oxidation and incorporation into lung lipids were also significantly increased. (Modified author abstract) GRA

N75-14439# Battelle Pacific Northwest Labs., Richland, Wash. Biology Dept.
EFFECTS OF EXPOSURE TO PULSED MICROWAVES (RADAR) ON CENTRAL NERVOUS SYSTEM EXCITABILITY IN LABORATORY ANIMALS Final Report
Edward L. Hunt, Richard D. Phillips, and Nancy W. King 10 Oct. 1974 70 p refs
(Contract N00014-70-C-0197; NR Proj. 101-09)
(AD-786753) Avail: NTIS CSCL 06/18

A microwave bioeffects project was designed to develop reliable exposure methods and dose estimation procedures for use with laboratory animals to investigate potential effects on central nervous system (CNS) excitability. A resonating cavity exposure system, powered by a commercial 2.45 GHz pulsed magnetron, was developed and provided accurate control of the integral energy delivered multilaterally to the animal. A high performance anechoic chamber facility, powered by a 2.88 GHz radar transmitter, pulsed with high peak power, provided plane wave irradiation. A biodosimetry method, based on latency for microwave-induced seizure, was developed for use in both systems for indexing exposure levels, for validating biophysical dosimetry measurements and for investigating effects of field geometry. (Modified author abstract) GRA

N75-14440# Bureau of Radiological Health, Rockville, Md.
BIOLOGICAL BASES FOR AND OTHER ASPECTS OF A PERFORMANCE STANDARD FOR LASER PRODUCTS
F. Alan Andersen Jul. 1974 29 p refs
(PB-235953/7; DHEW/FDA-75-8004) Avail: NTIS HC $3.75 CSCL 06R

The biological basis for a performance standard for laser products is found in the pattern of biological effects of light that can be considered as hazardous to human health and safety. From the pattern of known biological effects, a classification of laser emissions is made that define the relative hazard of the emissions. The result of the classification scheme is four classes of laser products in the proposed laser product performance standard which convey the risks associated with accessible emission as is now understood. GRA

N75-14359* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB MEDICAL PROGRAM OVERVIEW
Richard S. Johnston *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 1-47 refs (For availability see N75-14358 05-51)
CSCL 06E

N75-14363* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB CREW HEALTH - CREW SURGEONS' REPORTS
J. R. Hordinsky *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 61-73 (For availability see N75-14358 05-51)
CSCL 06E

N75-14364* Texas Univ., Houston.
SKYLAB ORAL HEALTH STUDIES
Lee R. Brown, William J. Frome (Air Force Dental Corps), Sandra Handler, Merrill G. Wheatcroft, and Linda J. Rider *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 75-97 refs (For availability see N75-14358 05-51)
CSCL 06E

N75-14365* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANALYSIS OF THE SKYLAB FLIGHT CREW HEALTH STABILIZATION PROGRAM
J. K. Ferguson, G. W. McCollum, and B. L. Portnoy (Public Health Service, Atlanta) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 99-119 (For availability see N75-14358 05-51)
CSCL 06E

N75-14367* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RADIOLOGICAL PROTECTION AND MEDICAL DOSIMETRY FOR THE SKYLAB CREWMEN
J. Vernon Bailey, R. A. Hoffman, and R. A. English *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 145-155 refs (For availability see N75-14358 05-51)
CSCL 06R

N75-14368* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
TOXICOLOGICAL ASPECTS OF THE SKYLAB PROGRAM
Wayland J. Rippstein, Jr. and Howard J. Schneider *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 157-168 refs (For availability see N75-14358 05-51)
CSCL 06T

N75-14370* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE EFFECTS OF PROLONGED EXPOSURE TO WEIGHTLESSNESS ON POSTURAL EQUILIBRIUM
J. L. Homick, M. F. Reschke, and E. F. Miller, II (Naval Aerospace Med. Res. Lab., Pensacola, Fla.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 221-238 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14373* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CHANGES IN THE ACHILLES TENDON REFLEXES FOLLOWING SKYLAB MISSIONS
J. T. Baker (Technology, Inc., Houston, Tex.), A. E. Nicogossian, G. W. Hoffler, R. L. Johnson, and J. R. Hordinsky *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 297-305 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14376* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MINERAL AND NITROGEN METABOLIC STUDIES, EXPERIMENT M071
G. Donald Whedon (NIH), Leo Lutwak (Calif. Univ. Los Angeles), Paul C. Rambaut, Michael W. Whittle, Malcolm C. Smith, Jeanne Reid (NIH), Carolyn S. Leach, Connie Rae Stadler (Technology, Inc., Houston, Tex.), and Deanna D. Sanford (Technology, Inc., Houston, Tex.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 353-371 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14377* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PHYSIOLOGICAL MASS MEASUREMENTS IN SKYLAB
William E. Thornton and J. Ord (Scott Air Force Base) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 373-386 (For availability see N75-14358 05-51)
CSCL 06P

N75-14378* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BONE MINERAL MEASUREMENT - EXPERIMENT M078
John M. Vogel (Calif. Univ., Davis) and M. W. Whittle *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 387-401 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14379* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MUSCULAR DECONDITIONING AND ITS PREVENTION IN SPACE FLIGHT
William E. Thornton and J. A. Rummel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 403-416 (For availability see N75-14358 05-51)
CSCL 06P

N75-14380* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOSTEREOMETRIC ANALYSIS OF BODY FORM
Michael W. Whittle, Robin Herron (Tex. Inst. for Rehabilitation and Res., Houston), and Jaime Cuzzi (Tex. Inst. for Rehabilitation and Res., Houston) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 417-424 refs (For availability see N75-14358 05-51)
CSCL 06B

N75-14382* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMICAL RESPONSES OF THE SKYLAB CREWMAN
Carolyn S. Leach and Paul C. Rambaut *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 427-454 refs (For availability see N75-14381 05-51)
CSCL 06A

N75-14383* Texas Univ., Galveston. Medical Branch.
CYTOGENIC STUDIES OF BLOOD (EXPERIMENT M111)
Lillian H. Lockhart *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 455-465 refs (For availability see N75-14381 05-51)
CSCL 06E

N75-14384* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE RESPONSE OF SINGLE HUMAN CELLS TO ZERO GRAVITY
P. OB. Montgomery, Jr. (Woodlawn Hosp., Dallas), J. E. Cook (Woodlawn Hosp., Dallas), R. C. Reynolds (Texas Univ., Dallas), J. S. Paul (Woodlawn Hosp., Dallas), L. Hayflick (Stanford Univ., Palo Alto, Calif.), D. Stock (Texas Univ., Houston), W. W. Schulz (Woodlawn Hosp., Dallas), S. L. Kimzey, R. G. Thirolf, T. Rogers et al *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 467-491 refs (For availability see N75-14381 05-51)
CSCL 06B

N75-14385* Baylor Univ., Houston, Tex. Coll. of Medicine.
BLOOD VOLUME CHANGES
Philip C. Johnson, Theda B. Driscoll, and Adrian D. LeBlance *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 495-505 refs (For availability see N75-14381 05-51)
CSCL 06E

N75-14386* Missouri Univ., Columbia.
RED CELL METABOLISM STUDIES ON SKYLAB
Charles E. Mengel *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 507-518 refs (For availability see N75-14381 05-51)
CSCL 06P

N75-14387* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EXPERIMENT M115: SPECIAL HEMATOLOGIC EFFECTS: DYNAMIC CHANGES IN RED CELL SHAPE IN RESPONSE TO THE SPACE-FLIGHT ENVIRONMENT
Stephen L. Kimzey, Linda C. Burns (Northrop Services, Inc., Houston, Tex.), and Craig L. Fischer (Eisenhower Memorial Hosp., Palm Desert, Calif.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 519-544 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14388* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LOWER BODY NEGATIVE PRESSURE: THIRD MANNED SKYLAB MISSION
R. L. Johnson, G. W. Hoffler, A. E. Nicogossian, S. A. Bergman, and M. M. Jackson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 545-595 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14389* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VECTORCARDIOGRAPHIC RESULTS FROM SKYLAB MEDICAL EXPERIMENT M092: LOWER BODY NEGATIVE PRESSURE
G. W. Hoffler, R. L. Johnson, A. E. Nicogossian, S. A. Bergman, and M. M. Jackson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 597-621 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14390* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEMODYNAMIC STUDIES OF THE LEGS UNDER WEIGHTLESSNESS

William E. Thornton and G. W. Hoffler *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 623-635 (For availability see N75-14381 05-51)
CSCL 06S

N75-14391* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ANTHROPOMETRIC CHANGES AND FLUID SHIFTS
William E. Thornton, G. W. Hoffler, and J. A. Rummel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 637-658 (For availability see N75-14381 05-51)
CSCL 06S

N75-14392* Vanderbilt Univ., Nashville, Tenn.
VECTORCARDIOGRAPHIC CHANGES DURING EXTENDED SPACE FLIGHT
Raphael F. Smith, Kevin Stanton (Naval Aerospace Med. Inst.), David Stoop (Naval Aerospace Med. Inst.), Donald Brown (Naval Aerospace Med. Inst.), Walter Janusz (Naval Aerospace Med. Inst.), and Paul King *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol 2 Nov. 1974 p 659-679 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14393* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF THE ELECTROMECHANICAL PROPERTIES OF THE CARDIOVASCULAR SYSTEM
Stuart A. Bergman, Jr., G. W. Hoffler, and R. L. Johnson *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 681-709 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14394* National Institutes of Health, Bethesda, Md.
EFFECT OF PROLONGED SPACE FLIGHT ON CARDIAC FUNCTION AND DIMENSIONS
Walter L. Henry, Stephen E. Epstein, James M. Griffith, Robert E. Goldstein, and David R. Redwood *In* NASA. Johnson Space Center Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 711-721 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14395* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RESULTS OF SKYLAB MEDICAL EXPERIMENT M171: METABOLIC ACTIVITY
E. L. Michel, J. A. Rummel, C. F. Sawin, M. C. Buderer (Technology, Inc., Houston, Tex.), and J. D. Lem *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 723-762 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14396* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PULMONARY FUNCTION EVALUATION DURING AND FOLLOWING SKYLAB SPACE FLIGHTS
C. F. Sawin, A. E. Nicogossian, A. P. Schachter (Technology, Inc., Houston, Tex.), J. A. Rummel, and E. L. Michel *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 763-774 refs (For availability see N75-14381 05-51)
CSCL 06E

N75-14397* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METABOLIC COST OF EXTRAVEHICULAR ACTIVITIES
James M. Waligora and David J. Horrigan, Jr. *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 775-784 refs (For availability see N75-14381 05-51)
CSCL 06S

N75-14398* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
DETERMINATION OF CARDIAC SIZE FROM CHEST ROENTGENOGRAMS FOLLOWING SKYLAB MISSIONS
A. E. Nicogossian, G. W. Hoffler, R. L. Johnson, and R. J. Gowen (Air Force Academy) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 2 Nov. 1974 p 785-793 refs (For availability see N75-14381 05-51)
CSCL 06P

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N75-14441*# Scientific Translation Service, Santa Barbara, Calif.
INFLUENCE OF SPATIAL AND ENERGISTIC FACTORS ON A VISUAL FIELD OF AN OPERATOR
V. A. Yekimov and V. M. Mironov Washington NASA Dec. 1974 13 p Transl. into ENGLISH from Vop. Psikhologii (USSR), v. 18, no. 5, 1974 p 124-128
(Contract NASw-2483)
(NASA-TT-F-16081) Avail: NTIS HC $3.25 CSCL 05E
The influence of spatial and energistic factors upon the visual field of an operator was studied as a function of the angle of view under the influence of the following factors: dimensions of the recording, its brightness, color, and external illumination.
Author

N75-14442*# Scientific Translation Service, Santa Barbara, Calif.
THE HYGIENIC BASIS OF STANDARDS OF ILLUMINATION. TYPES OF VISUAL FATIGUE
S. V. Kravkov Washington NASA Dec. 1974 18 p refs Transl. into ENGLISH from the book "In Glaz i Ego Rabota" Moscow, Medgiz, 1945 p 331-339
(Contract NASw-2483)
(NASA-TT-F-16066) Avail: NTIS HC $3.25 CSCL 05E
An evaluation is made of eye fatigue over a long working period under given lighting conditions. Methods of measuring visual fatigue and the resultant data are discussed. It is found that the method of optical ergography is not very sensitive.
Author

N75-14443*# Stanford Univ., Calif. Electronics Labs.
BIOELECTRIC SIGNAL ANALYSIS AND MEASUREMENT Final Technical Report
David C. Lai Jan. 1975 32 p refs
(Grant NGR-05-020-575)
(NASA-CR-141168) Avail: NTIS HC $3.75 CSCL 06D
Nonstationary time series techniques are used to analyze EEG signals for the estimation of alertness. A time varying order is extracted in sequential time series measurement of these data and strategies are devised for obtaining optimal representation of the EEG signal.
Author

N75-14444*# Florida Univ., Gainesville. Dept. of Psychology.
ELECTROENCEPHALOGRAPHIC STUDIES OF SLEEP Final Report, 1 Jan. - 31 Dec. 1974
W. B. Webb and H. W. Agnew, Jr. 10 Jan. 1975 7 p refs
(Grant NGR-10-005-057)
(NASA-CR-141144) Avail: NTIS HC $3.25 CSCL 06S
Various experimental studies on sleep are described. The following areas are discussed: (1) effect of altered day length on sleep, (2) effect of a partial loss of sleep on subsequent nocturnal sleep; (3) effect of rigid control over sleep-wake-up times; (4) sleep and wakefulness in a time-free environment; (5) distribution of spindles during a full night of sleep; and (6) effect on sleep and performance of swiftly changing shifts of work.
J.M.S.

N75-14445# Army Combat Developments Experimentation Command, Fort Ord, Calif.
NIGHT NAP-OF-THE EARTH FLIGHT TRAINING
Frederick A. Isgrig and Paul R. Best, Jr. 1973 15 p
(AD-785635) Avail: NTIS CSCL 05/9
The paper discusses the exploratory evaluation of training requirements and performance expectations for night tactical operations by conventionally equipped attack helicopter teams. (Modified author abstract)
GRA

N75-14446*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
HUMAN FACTORS CONSIDERATIONS FOR THE USE OF COLOR IN DISPLAY SYSTEMS
Sylvester A. DeMars 5 Jan. 1975 36 p refs
(NASA-TM-X-72196; TR-1329) Avail: NTIS HC $3.75 CSCL 05E

Identified and assessed are those human factor considerations impacting an operator's ability to perform when information is displayed in color as contrasted to monochrome (black and white only). The findings provide valuable guidelines for the assessment of the advantages (and disadvantages) of using a color display system. The use of color provides an additional sensory channel (color perception) which is not available with black and white. The degree to which one can exploit the use of this channel is highly dependent on available display technology, mission information display requirements, and acceptable operational modes. Author

N75-14447*# Western Michigan Univ., Kalamazoo.
THE EFFECTS OF SIMULTANEOUS BUT UNEQUAL RESPONSE-INDEPENDENT PAY TO PAIRS OF HUMAN SUBJECTS ON MASSETER EMG AND BODILY MOVEMENTS M.S. Thesis
David M. Keenan Aug. 1974 38 p refs
(Grant NGR-23-014-002; Contract N00014-70-A-0183-0001; Grant NSF GB-33620X)
(NASA-CR-141286) Avail: NTIS HC $3.75 CSCL 05E

Electromyographic activity and bodily movement of the masseter muscle were recorded in three pairs of human subjects, where one member of each pair was systematically presented with greater pay and each could reduce the value of money received by the other. The number of biting responses was as high or higher for the subject receiving less money immediately after coin delivery. However, the number of masseter contractions for the subject receiving more money remained higher at other times during the unequal pay conditions. No responses of pay reduction were emitted by any subject toward another. Author

N75-14448*# Kalamazoo State Hospital, Mich. Research Dept.
THE MEASUREMENT AND FACILITATION OF COOPERATIVE TASK PERFORMANCE Final Report, 1 Feb. 1974 - 31 Jan. 1975
Ronald R. Hutchinson 13 Jan. 1975 20 p refs
(NASA-CR-141285; Grant NGR-23-014-002) Avail: NTIS HC $3.25 CSCL 05J

Experiments were conducted to determine under what conditions jaw clenching will occur in humans as a response to stress exposure. The method for measuring reactions to stress involves a series of electrical recordings of the masseter and temporalis muscles. A high fixed-ratio response requirement in the first series of experiments shows that jaw clenching in humans occurs in situations analogous to those which produce biting in infrahuman subjects. In the second series, reduction in the amounts of money recieved by subjects is shown to cause increases in the jaw clench response and other negative effect motor behaviors. The third series demonstrates that perception of more favorable conditions existing for another person can increase anger and hostility in the subject. N.E.R.

N75-14449# Civil Aeromedical Inst., Oklahoma City, Okla.
ADAPTATION TO VESTIBULAR DISORIENTATION. 12: HABITUATION OF VESTIBULAR RESPONSES: AN OVERVIEW
William E. Collins Mar. 1974 41 p refs
(AD-780562; FAA-AM-74-3) Avail: NTIS HC $3.75

The possibility is investigated of abolishing or reducing undesired vestibular responses (inaccurate experiences of motion and eye movements which could blur vision) by repeated exposure to appropriate stimulus conditions. Relevant research is reviewed, with emphasis on activity and responses from the semicircular canals of the vestibular system. Methodological problems are presented briefly and the influence of arousal on vestibular responses is detailed. Data obtained from animals and from man are treated separately. Author

N75-14450# Commissariat a l'Energie Atomique, Grenoble (France).
ACQUISITION AND PROCESSING METHOD FOR HUMAN SENSORIAL, SENSITIVE, MOTORY, AND PHONATORY CIRCUITS REACTION TIMES Ph.D. Thesis - Univ. (Sci. et Med.)
C. Doche Jun. 1974 120 p refs In FRENCH
(CEA-R-4534) Avail: AEC Depository Libraries HC $9.00

Steps taken to measure the precise reaction of human sensorial, sensitive, motory, and phonatory circuits are explained. Methods are also proposed for the determination and treatment of latent reaction problems in the sensory circuits.
Transl. by E.H.W.

N75-14451# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
HUMAN OPERATOR CHARACTERISTICS AND CAPABILITIES IN PERFORMING PROCESS CONTROL TASKS
K. Etschberger and R. Zimmermann Jan. 1974 27 p refs In GERMAN
(KFK-PDV-19) Avail: AEC Depository Libraries HC $4.50

The integration of relevant human behavior traits and human capabilities for improved control of technological processes is considered. Transl. by G.G.

N75-14452# Institut fuer Informationsverarbeitung in Technik und Biologie, Karlsruhe (West Germany).
ANALYSIS OF TWO-DIMENSIONAL BIOLOGICAL RECEIVER SYSTEMS USING DETECTION EXPERIMENTS [ANALYSE FLAECHENHAFTER BIOLOGISCHER EMPFANGSSYSTEME MIT HILFE VON DETEKTIONSEXPERIMENTEN]
D. Paul Bonn Bundeswehramt 1974 104 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(BMVG-FBWT-74-4) Avail: NTIS HC $5.25; Bundeswehramt 30 DM

Analytical methods were developed for the identification of the structure of sense organs with two-dimensional receptor arrays, i.e. linear receptors and axisymmetric coupling functions, and nonlinear receptor systems and nonaxisymmetric coupling functions. These methods were applied to experimental studies on the human visual system and the electric organ of the weakly-electric fish gnathonemus. During the experiments these biological receiver systems were forced to operate in the mode of binary signal detection; the examined sense organs had to determine whether a certain signal was present or not. The result of the studies is a decision rule which quantitatively describes the behavior of the system with respect to the detection task. Author (ESRO)

N75-14453# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
A PSYCHOLOGICAL EXPLANATION OF SONAR DEGRADATION
W. A. Wagnaar, A. A. Bunt, and L. W. M. Spiekman 1974 9 p refs In DUTCH; ENGLISH summary
(Contract A73/KM/032)
(IZF-1974-10; TDCK-64281) Avail: NTIS HC $3.25

Sonar degradation is discussed for the situation in which sonar operators perform better in an experimental than operational situation. These situations are psychologically different. In the experimental situation there is neither time nor signal uncertainty (cueing condition), whereas the reverse is the case in an operational situation (noncueing condition). Moreover, vigilance aspects can be attributed to the latter situation, since operators have to wait a long time for the next critical series of signals. This consideration was illustrated by a simple experiment in which there were no vigilance aspects. In the noncued situation, the results indicate that cueing was better than non-cueing performance. It is shown that the difference would have been even larger if the noncueing task had been a realistic vigilance task. It appears that a psychological explanation of the sonar degradation phenomenon is plausible. ESRO

N75-14454# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
AMPHETAMINE AND BARBITURATE EFFECTS ON TWO TASKS PERFORMED SINGLY AND IN COMBINATION
C. L. Truijens, D. A. Trumbo, and W. A. Wagenaar 1974 21 p refs
(IZF-1974-11; TDCK-64575) Avail: NTIS HC $3.25

The effects of amphetamine and barbituate on the performance of two specific tasks were investigated. The two tasks are identified as randomization and pursuit tracking. The subjects

performed the tasks both separately and simultaneously. During randomization, both the barbituate and a secondary task resulted in a shift toward repetition. Amphetamine had the opposite effect. Barbituate and a secondary task produced higher error scores during pursuit tracking tests. Amphetamine produced a lower score during pursuit tracking. No interaction between drug treatment and single versus dual tasks occurred during randomization or tracking tests. It was concluded that drugs and dual tasks affect different stages of information processing. ESRO

N75-14455# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
COLORIMETRIC AND PHOTOMETRIC PROPERTIES OF A 2 DEG FUNDAMENTAL OBSERVER
J. J. Vos 1974 21 p refs
(IZF-1974-12; TDCK-64576) Avail: NTIS HC $3.25

Chromaticity data, color matching functions, and receptor system primaries were tabulated for a two degree fundamental observer. These tables are the result of combining data from various sources, they are intended as complementary tables to those published by the International Commission on Illumination. ESRO

N75-14456# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
SOME REMARKS ON USING CLEAR VISORS DURING NIGHT FLIGHTS IN THE ALOUETTE 3
J. Walraven 1974 6 p In DUTCH; ENGLISH summary
(Contract A73/KLu/076)
(IZF-1974-13; TDCK-64630) Avail: NTIS HC $3.25

Wearing an (obligatory) clear visor during night flights in the Alouette III may cause, according to complaints from some pilots, visual discomfort because of reflections from the rim of the visor. It was verified that these reflections cause no reduction of visual functions but that the visibility of the rim might indeed cause some hindrance, particularly during landing operations. Three solutions are suggested: (1) beveling and polishing the rim of the visor, causing a noticeable reduction reflections; (2) using safety glasses; and (3) withdrawing the regulation, at least under the given circumstances, that helicopter pilots should wear the clear visor. Author (ESRO)

N75-14457# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE IW-TNO SIMULATOR. AN INVESTIGATION OF ROTATION SENSATION
M. L. Toppinga 1974 97 p refs In DUTCH; ENGLISH summary
Sponsored by Res. Inst. for Road Vehicles TNO
(IZF-1974-16; TDCK-64715) Avail: NTIS HC $4.75

The simulation of acceleration and deceleration time functions, as experienced during automobile driving, was investigated by means of a moving base simulator based on a swing construction. In addition, rotation accelerations, generated as a by-product by the proposed simulator, were examined. Two simultaneous differential equations for swing excursion and liquid rotation in a semicircular channel were treated, using Laplace techniques, while applying an acceleration function with a variable slope. Computations were carried out to determine liquid rotation functions versus time, which were compared to experimental threshold values, taking into account threshold raising effects for an existing driving task. It is concluded that a driver in a swing type moving base simulator will most probably undergo realistic acceleration sensations. ESRO

N75-14458# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
ERGONOMICS FOR COMMAND AND CONTROL ROOMS
H. J. Leebeek 1974 74 p refs In DUTCH; ENGLISH summary
(IZF-1974-17; TDCK-65078) Avail: NTIS HC $4.25

Optimal arrangements and shaping for command and control rooms with regard to human factors engineering are summarized. Some of the aspects are the arrangement of equipment, color and lighting specifications, wall finishing, and effects occurring when looking through windows. The utilization of display scopes, computer terminals, systems, etc., is discussed. An effort is made to provide specifications for direct use in practical situations. ESRO

N75-14459# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
SOME EFFECTS OF ACTH 4-10 ON PERFORMANCE DURING A SERIAL REACTION TASK
A. W. K. Gaillard and A. F. Sanders 1974 21 p refs Sponsored by NV Organon
(IZF-1974-19; TDCK-65253) Avail: NTIS HC $3.25

A group of 18 subjects, 9 injected with ACTH 4-10 and 9 with placebo, worked continuously during 30 minutes in a self paced reaction task. The test group showed a larger improvement in reaction time than the control group. This effect disappeared in a short retest. Results suggest that the peptide has no effect on skill acquisition but counteracts building up of reactive inhibition, i.e. suppresses decrease in motivation occurring during continuous performance. ESRO

N75-14460# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE EFFECTS OF ACTH 4-10 ON A SERIAL LEARNING AND A SHORT-TERM RETENTION TASK
A. A. Bunt and A. F. Sanders 1974 9 p refs Sponsored by NV Organon
(IZF-1974-21; TDCK-65252) Avail: NTIS HC $3.25

The effects of ACTH on serial learning of a list of single words and on short term retention of lists of known and unknown length were tested by two separate double blind studies. ACTH slows down the rate of serial learning. In the short term retention test an effect of ACTH was found only when the list length was unknown. ACTH had a negative effect on the recall of the list position which has to be reproduced first. This suggests that ACTH operates negatively on temporal recency cues which are supposed to mediate retrieval under the conditions of the experiment. ESRO

N75-14461# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.
BEHAVIOR OF CIRCADIAN RHYTHM OF TEMPERATURE AND PERFORMANCE AFTER TWO SUBSEQUENT TRANSATLANTIC FLIGHTS Ph.D. Thesis - Bonn Univ. [DAS VERHALTEN DER TAGESRHYTHMIK VON KOERPERTEMPERATUR UND LEISTUNG NACH ZWEI TRANSATLANTIKFLUEGEN IN RASCHER FOLGE]
Raimund Haske 18 Jul. 1974 52 p refs In GERMAN; ENGLISH summary
(DLR-FB-74-55) Avail: NTIS HC $4.25; DFVLR, Porz, West Ger. 21,20 DM

Circadian rhythms of temperature and performance were studied in 8 students in 3-hour-intervals during periods of 24 hours after a jet flight from Germany to the U.S. and vice versa with a stay of 24 hours in the U.S. Two 24-hour preflight periods revealed the basic normal daily rhythm of temperature and performance. The effects of a 6 hour time shift after the 24-hour stay in the U.S. were evaluated by determining temperature and performance parameters on day 1, 3, and 5 following the flights. A considerable desynchronization with local time was observed after flights. The subsequent resynchronization time amounted up to 3 to 5 days in Germany. Author (ESRO)

N75-14462# Institut Franco-Allemand de Recherches, St. Louis (France).
INFLUENCE OF A PRECURSOR NOISE ON THE STARTLE DUE TO IMPULSE NOISE (WEAPON NOISE) [INFLUENCE D'UN BRUIT PRECURSEUR SUR LE SURSAUT DU A UN BRUIT IMPULSIONNEL (BRUIT D'ARME)]
A. Dancer, R. Franke, and G. Chatelier (LEMP) 7 Aug. 1973 32 p refs In FRENCH
(ISL-20/73) Avail: NTIS HC $3.75

The startle following an impulse noise due to an electric detonation is considerably reduced when the impulse noise is preceded by a white noise of sufficiently long duration (about 750 ms) and 25 dB intensity. The results from a target aiming experiment also show an improvement in performance and accelerated acclimatization. ESRO

N75-14463# Institut Franco-Allemand de Recherches, St. Louis (France).
SONIC BOOMS EFFECTS ON SLEEP [EFFETS DU BANG

SONIQUE SUR LE SOMMEIL]
G. Jansen (Essen Univ.) 16 Jan. 1974 37 p Transl. into FRENCH from Beeinflussung des Nachtschlafs durch den Flugzeugknall In FRENCH
(Contract DRME-72/693)
(ISL-2/74) Avail: NTIS HC $3.75

The EEC and peripheral circulation modifications induced by sonic booms during human sleep are presented. Experiments were performed during two periods of 19 and 43 days at the rate of 2 to 4 sonic booms per night, sound pressure between 67 and 77 db (A), duration 300 ms, and pressure intensity 1 mbar. Experiments were performed during low EEG frequency periods (deep sleep). A significant and regular increase of electrical activity was demonstrated with no habituation together with significant and regular decrease of peripheral circulation. During low frequency EEG activity the induced perturbation duration and intensity increases. The reduction of the onset of deep sleep stage 3 was compensated by subsequent sleep. No overall modification of sleep characteristics was possible nor was any relationship derived between sleep deepness and neuronic activity. Indeed a constant sound pressure level in the room was impossible to maintain. ESRO

N75-14464# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
FREQUENCY DISCRIMINATION AS A FUNCTION OF THE NUMBER OF PERIODS OF THE SIGNAL PRESENTED
Thomas J. Moore Aug. 1974 15 p refs
(AF Proj. 7233)
(AD-786457; AMRL-TR-74-62) Avail: NTIS CSCL 05/10

The present experiment attempted to determine how frequency discrimination improved as a function of the number of periods of the signal presented. Performance was found to improve in the same manner for frequencies from 100 to 8000 Hz and discrimination was maximized for all frequencies at about the same number of periods. The argument was made that the results could best be explained by postulating that the auditory system accomplishes frequency discrimination by means of a phase frequency analysis mechanism. Author (GRA)

N75-14465# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HUMAN FACTORS IN ENGINEERED SYSTEMS: WHERE THE (INTER) ACTION IS
Julien M. Christensen Sep. 1974 23 p refs
(AF Proj. 7184)
(AD-785214; AMRL-TR-74-98) Avail: NTIS CSCL 05/10

A view is presented on motivation and self actualization incentives as a means of engineering humans to their best performance on the job. GRA

N75-14466# Army Edgewood Arsenal, Md.
THE EFFECT OF SOUND ON MAN (SELECTIVE ANNOTATED BIBLIOGRAPHY, 1965 - 1972 Technical Report, Sep. - Dec. 1972
K. A. Zych Sep. 1974 28 p refs Sponsored in part by HDL
(DA Proj. 1W5-62606-AD-16)
(AD-785525; EB-TR-74020) Avail: NTIS CSCL 06/21

The literature on the effects of sound on man was reviewed for the years 1965-1972. The purpose of the review was to identify the aversive properties of sound which might be exploited in the development of nonlethal (and non-permanently-damaging) weapon systems. The results suggest that, although parameters such as frequency, wave form, and sound pressure level do affect human behavior, further experimental work is needed in the analysis and synthesis of aversive sounds before significant short-term behavioral changes are possible. Author (GRA)

N75-14369* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EXPERIMENT M-131. HUMAN VESTIBULAR FUNCTION
Ashton Graybiel (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), Earl F. Miller, II (Naval Aerospace Med. Res. Lab., Pensacola, Fla.), and J. L. Homick *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 169-220 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14371* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SKYLAB SLEEP MONITORING EXPERIMENT (M133)
James D. Frost, Jr. (Methodist Hospital), William H. Shumate, Joseph G. Salamy (Technology, Inc., Houston, Tex.), and Cletis R. Booher *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 239-285 refs (For availability see N75-14358 05-51)
CSCL 05E

N75-14372* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VISUAL LIGHT FLASH OBSERVATIONS ON SKYLAB 4
R. A. Hoffman, L. S. Pinsky (Tex. Univ., Houston), Z. Osborne (Tex. Univ., Houston), and J. V. Bailey *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 287-295 refs (For availability see N75-14358 05-51)
CSCL 06P

N75-14375* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW EFFICIENCY ON FIRST EXPOSURE TO ZERO-GRAVITY
Owen K. Garriott and Gary L. Doerre *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 341-352 refs (For availability see N75-14358 05-51)
CSCL 05E

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N75-14467*# Life Systems, Inc., Cleveland, Ohio.
ELECTROCHEMICAL CARBON DIOXIDE CONCENTRATOR SUBSYSTEM MATH MODEL Final Report
R. D. Marshall, J. N. Carlson, and F. H. Schubert Sep. 1974 210 p refs
(Contract NAS2-6478)
(NASA-CR-137565; LSI-ER-220-6) Avail: NTIS HC $7.25 CSCL 06K

A steady state computer simulation model has been developed to describe the performance of a total six man, self-contained electrochemical carbon dioxide concentrator subsystem built for the space station prototype. The math model combines expressions describing the performance of the electrochemical depolarized carbon dioxide concentrator cells and modules previously developed with expressions describing the performance of the other major CS-6 components. The model is capable of accurately predicting CS-6 performance over EDC operating ranges and the computer simulation results agree with experimental data obtained over the prediction range. Author

N75-14468*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TESTS OF PROTECTIVE CLOTHING FOR THE SAFE HANDLING OF PRESSURIZED LAMPS
John G. Ewashinka Washington Jan. 1975 20 p ref
(NASA-TM-X-3147; E-7933) Avail: NTIS HC $3.25 CSCL 06Q

Tests were made to find a clothing material combination for use in handling high-pressure lamps. Monofilament nylon, ballistic nylon, and ballistic felt grouped into various multilayer combinations and chromed leather were positioned around and 30 cm (12 in.) away from exploding high-pressure lamps of different manufacturers and wattages. The results are: (1) 5024 nylon/ballistic felt/5024 nylon in a layered configuration was not penetrated by fragments of lamps as large as 6.5 kW; (2) this layered combination is lightweight and pliable and offers greater mobility and comfort to the user than previous protective clothing; and (3) Lexan plastic 1.6 mm (1/6 in.) thick to be used for face shield material showed no penetration for lamps as large as 20 kW. Author

N75-14469# Centraal Instituut voor Voedingsonderzoek TNO, Zeist (Netherlands).
PRESERVING TESTS WITH OILS AND FATS IN THE FIRA-ASTELL OXYGEN ABSORPTION APPARATUS 1 [HOUDBAARHEIDSPROEVEN MET OLIEN EN VETTEN IN HET FIRA-ASTELL OXYGEN ABSORPTION APPARATUS 1]
C. Vinkenborg, comp. and H. Haman, comp. Aug. 1974 12 p In DUTCH
(R-4439; TDCK-65122) Avail: NTIS HC $3.25

First results of tests with the Fira-Astell oxygen absorption apparatus for determining the keeping qualities of oils and fats are presented. Tests were carried out with fats and soybean oil; results correlated with complicated swift and/or scale tests.
ESRO

N75-14470# School of Aerospace Medicine, Brooks AFB, Tex.
OXYGEN CONTAMINANT DETECTION: PROCEDURES FOR FIELD ANALYSIS OF AVIATOR'S BREATHING OXYGEN Interim Report, Oct. 1972 - Oct. 1973
Walter L. Crow and Kenneth G. Ikels Sep. 1974 39 p ref (AF Proj. 7164)
(AD-786916; SAM-TR-74-24) Avail: NTIS CSCL 01/2

Until recently, no instrument displayed the sensitivity, stability, and portability necessary for on-site field analysis of trace contaminants in aviator's breathing oxygen (ABO). A solid-state portable infrared gas analyzer became commercially available in 1971, which led to development of an instrument package capable of analyzing ABO at the base level. Procedures for field analysis of ABO are given as a guide for Air Force personnel using the ABO contaminant detector system developed by USAFSAM.
Author (GRA)

N75-14471# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HEARING PROTECTION OF EARMUFFS WORN OVER EYEGLASSES Final Report
Charles W. Nixon and W. C. Knoblach Jun. 1974 32 p refs (AF Proj. 7231)
(AD-785386; AMRL-TR-74-61) Avail: NTIS CSCL 06/17

The hearing protection ordinarily provided by earmuffs is reduced when worn by persons who also wear eyeglasses because sound enters the device through air leaks around the eyeglass temple - earmuff cushion interface. This study examined the acoustic fit of different earmuff protectors and various types of eyeglass frames found in a population, measured the loss of attenuation due to programmed air leaks and measured differences in earmuff protection for subjects while wearing and not wearing eyeglasses. Results demonstrated that earmuffs worn over eyeglasses lose from 1 db to 10 db of attenuation at individual frequencies. The amount of loss is related to type of earmuff, type of eyeglasses as well as frequency of the sound. Two remedial approaches were identified as authorizing for use by eyeglass wearers only earmuffs that demonstrate by test satisfactory sound protection with eyeglasses, and the use of an insert or pad at the eyeglass temple - earmuff cushion interface to minimize and eliminate the acoustic leak. Author (GRA)

N75-14374* National Aeronautics and Space Administration, Washington, D.C.
TASK AND WORK PERFORMANCE ON SKYLAB MISSION 2, 3 AND 4 (TIME AND MOTION STUDY - EXPERIMENT M151)
Joseph F. Kubis (Fordham Univ.), Edward J. McLaughlin, Rudolph Rusnak (Fordham Univ.), Gary H. McBride (Fordham Univ.), and Susan V. Saxon (Fordham Univ.) *In its* Proc. of the Skylab Life Sci. Symp., Vol. 1 Nov. 1974 p 307-399 (For availability see N75-14358 05-51)
CSCL 05E

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N75-14472# California Univ., Los Angeles. Dept. of Computer Science.
SYNTHESIS OF PROPERLY TERMINATING GRAPHS
M. Yavne Apr. 1974 156 p refs
(Contract AT(04-3)-34)
(UCLA-34-P-214-2; UCLA-ENG-7434) Avail: NTIS HC $6.25

Techniques for synthesis of properly terminating (PT) graphs are presented. The first technique consists of a set of PT-ness preserving procedures which can be applied to simpler PT graphs to yield other more complex PT graphs. The second technique consists of a method of combining subgraphs and keeping track of all possible flows-of-control so that it is possible to say whether the combined graph is PT. Author

N75-14473# Sandia Labs., Albuquerque, N.Mex.
MINICOMPUTER SAFETY CONTROL AND DATA SYSTEM FOR AN EXPLOSIVE FACILITY
M. H. Woodward Jun. 1974 108 p refs
(Contract AT(29-1)-789)
(SLA-74-0195) Avail: NTIS HC $5.25

A small explosives laboratory was automated for various operations by the installation of a Hewlett-Packard minicomputer and assorted peripherals. The system is to provide an on-line automated safety interlock and simultaneously calibrate up to 16 oscilloscopes. Future expansion for extensive applications in data acquisition, analysis, and processing is possible. Author

N75-14474# Science Research Council, Chilton (England). Rutherford Lab.
MNLISTPR: A LIST PROCESSING PACKAGE FOR FLEXIBLE STORAGE OF DATA
M. J. Newman Apr. 1974 10 p
(RL-74-059) Avail: AEC Depository Libraries HC $4.00

A package of fortran routines is described which enables a user to store data in an array in a flexible and efficient manner. It is particularly useful when different items of data may be of different and unknown lengths, and when data will need to be edited. Applications in the fields of information retrieval and boundary definition in mathematical modelling are described.
Author

N75-14475# Technische Universitaet, Brunswick (West Germany). Inst. fuer Datenverarbeitungsanlagen.
4KBIT-CORE MEMORY FOR HELIOS [4KBIT-KERNSPEICHER FUER HELIOS]
Manfred Gaertner, Fritz Gliem, Manfred Schlenther, and Christhard

Tscheuschner Bonn Bundesmin. fuer Forsch. und Technol. Sep. 1974 81 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-W-74-06) Avail: NTIS HC $4.75; ZLDI, Munich 16.20 DM

The 4K Bit-core memory for the Helios experiments 2, 4 and 6 is described. The memory is organized bit-serially. Its special characteristics are small power dissipation, savings in the selection electronics, and operation with only one TTL-compatible supply voltage. The memory structure, the memory matrix, and all special circuits are described in detail.
Author (ESRO)

N75-14476# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
EXPERIMENT D2B, REAL TIME SIMULATION AND ACQUISITION [EXPERIENCE D2B SIMULATION ET ACQUISITION EN TEMPS REEL]
Jean-Marie Perrin May 1973 201 p refs In FRENCH
(LAS-73-ELC-077-D2B) Avail: NTIS HC $7.25

The zodiacal light experiment on board the d-2b satellite is described briefly. The ultraviolet spectrophotometer to be used for the experiment is specified. The real time data acquisition system is discussed in detail, including hardware generalities on computer-peripherals exchange, hardware and software applications, computer-peripherals interface, and data acquisition software. The software for handling of data acquired in real time is presented. The computer programs were written in Assembler. ESRO

N75-14477# Heinrich-Hertz-Institute fuer Schwingungsforschung, Berlin (West Germany). Abteilung Informationsverarbeitung.
FLAVIS - A HIDDEN LINE ALGORITHM FOR DISPLAYING SPATIAL CONSTRUCTS GIVEN BY POINT SETS
Peter Mahnkopf and Jose Luis Encarnacao 31 Dec. 1973 154 p refs
(TB-148) Avail: NTIS HC $6.25

An algorithm which enables suppression of hidden lines when displaying and manipulating three-dimensional objects in computer graphics is described. It is based on point sets, i.e. the objects to be displayed are defined as a set of points in space. The method is very general and independent of the form of input data. To minimize computer time, the point set is projected onto a cartesian grid with vertex length n. During visibility investigation, only those areas are considered whose intersection with the grid square, in which the test point is located, is nonzero. The computing time required by the algorithm is inversely proportional to the square of the grid size n. ESRO

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N75-14478*# Notre Dame Univ., Ind. Dept. of Electrical Engineering.
CONVOLUTIONAL CODING TECHNIQUES FOR DATA PROTECTION Final Report
James L. Massey 2 Jan. 1975 15 p
(Grant NGL-15-004-206)
(NASA-CR-141132) Avail: NTIS HC $3.25 CSCL 09B

Results of research on the use of convolutional codes in data communications are presented. Convolutional coding fundamentals are discussed along with modulation and coding interaction. Concatenated coding systems and data compression with convolutional codes are described. J.M.S.

N75-14479*# Intermetrics, Inc., Cambridge, Mass.
HAL/S PROGRAMMER'S GUIDE
P. M. Newbold and R. L. Hotz 15 Aug. 1974 240 p
(Contract NAS9-13864)
(NASA-CR-140389; IR-63-4) Avail: NTIS HC $7.50 CSCL 09B

HAL/S is a programming language developed to satisfy the flight software requirements for the space shuttle program. The user's guide explains pertinent language operating procedures and described the various HAL/S facilities for manipulating integer, scalar, vector, and matrix data types. A.A.D.

N75-14480*# Computer Sciences Corp., Mountain View, Calif.
A STANDARD KINEMATIC MODEL FOR FLIGHT SIMULATION AT NASA AMES Final Report
Richard E. McFarland Washington NASA Jan. 1975 53 p refs
(Contract NAS2-7806)
(NASA-CR-2497) Avail: NTIS HC $4.25 CSCL 09B

A standard kinematic model for aircraft simulation exists at NASA-Ames on a variety of computer systems, one of which is used to control the flight simulator for advanced aircraft (FSAA). The derivation of the kinematic model is given and various mathematical relationships are presented as a guide. These include descriptions of standardized simulation subsystems such as the atmospheric turbulence model and the generalized six-degrees-of-freedom trim routine, as well as an introduction to the emulative batch-processing system which enables this facility to optimize its real-time environment. Author

N75-14481*# Northrop Services, Inc., Huntsville, Ala.
SIMULATION OF RANDOM WIND FLUCTUATIONS
Morris Perlmutter Sep. 1974 22 p refs
(Contract NAS8-21810)
(NASA-CR-120561) Avail: NTIS HC $3.25 CSCL 09B

A technique was developed for the simulation of random wind fluctuations for use in computer studies of the space shuttle ascent control. The simulated wind fluctuations were generated using the techniques of control theory that have statistical characteristics similar to the characteristics obtained from wind data at Kennedy Space Center. Author

N75-14482# Sandia Labs., Albuquerque, N.Mex.
QMESH: A SELF-ORGANIZING MESH GENERATION PROGRAM
R. E. Jones Jul. 1974 59 p refs
(Contract AT(29-1)-789)
(SLA-73-1088) Avail: NTIS HC $4.25

The two-dimensional mesh generation program, QMESH, is presented. QMESH produces meshes having quadrilateral elements on arbitrarily shaped bodies by treating bodies as collections of regions described by a flexible, modular input scheme. Existing methods of initial mesh generation and smoothing are incorporated into QMESH, and more general smoothing capabilities are developed. Techniques of automatic mesh restructuring are introduced and coupled with smoothing techniques to produce improved meshes without user interaction. A bandwidth minimization program, RENUM, for use with QMESH is included. Author

N75-14483# Ames Lab., Iowa.
SOFTWARE ORGANIZATION FOR THE CONTROL OF MULTIPLE PROCESSES Ph.D. Thesis
J. H. Campbell May 1974 133 p refs
(Contract W-7405-eng-82)
(IS-T-641) Avail: NTIS HC $5.75

A high quality, nondedicated software organization is achieved for small and medium sized computers. A software organization is described which combines a PL/1 based programming language, a modular structured compiler for this programming language, and an attendant operating system to support multiprogramming, real time, and interactive facilities which are normally found only in much larger computing systems. The language extensions made to PL/1 in the areas of multitasking, external interrupt handling, and experimental communication are presented. The compiler for this programming language is presented along with a detailed description of the operating system which provides the necessary run time support for the object programs generated by the compiler. Author

N75-14484# Sandia Labs., Livermore, Calif.
PILOT MANUAL FOR SALOGS LOGIC SIMULATION PROGRAM
M. A. Soderstrand Aug. 1974 26 p refs
(Contract AT(29-1)-789)
(SAND-74-8201) Avail: NTIS HC $3.75

The SALOGS Logic Simulation Program has available a comprehensive plotting capability allowing the designer to obtain detailed timing diagrams on hard copy, microfilm, the interactive graphics console, or even on the line printer. This manual is a User's Manual for obtaining plots using the SALOGS program. Since the plot package uses the extremely flexible plotting system, SLPLOT, the program presents a powerful tool for simulating and analyzing digital logic circuits. Since the plotting routines are all written in FORTRAN, it would be relatively easy to implement these programs at other installations, although this requires an interface program. Author

N75-14485# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
RECOGNITION OF SYMBOLS ON VISUAL DISPLAYS (RECOMMENDATIONS FOR EQUIPMENT DESIGNERS)
R. Moog Mar. 1974 56 p refs In GERMAN; ENGLISH summary
(KFK-PDV-22) Avail: AEC Depository Libraries HC $6.00

Human factors information related to the design of visual displays are discussed, with emphasis on CRT's. The legibility of alphanumeric and other elementary geometrical symbols is treated in detail. Author

N75-14486# Kernforschungsanlage, Juelich (West Germany). Zentralinst. fuer Angewandte Mathematik.
QUADRATIC PROGRAMMING BY SUCCESSIVE OVER-RELAXATION
U. Eckhardt Apr. 1974 27 p refs
(JUL-1064-MA) Avail: AEC Depository Libraries HC $4.50

The idea of solving the definite linear complementarity problem by successive overrelaxation was originally proposed by Cryer. A detailed discussion of Cryer's method applied to quadratic programming problems is given. The convergence behavior is treated without assumptions on solvability of the problem. Numerical examples indicate the efficiency of the method. Author

N75-14487# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DISCRETE CORRELATION ANALYSIS USING DIGITAL INTEGRATORS
G. Sh. Avetisov and S. V. Chernukhin 5 Aug. 1974 15 p refs Transl. into ENGLISH from Analogovaya i Analog-Tsefrovaya Vychislitelnaya Tekhn. SB. Statei (USSR), no. 5, 1973 p 193-201
(AD-784707; FTD-MT-24-1599-74) Avail: NTIS CSCL 09/2

The construction of a special purpose computer for processing ionospheric data in digital form is discussed in terms of calculating the auto- and cross-correlation functions. Block diagrams of the computer are presented, and the actual computing times are given. F.O.S.

62 COMPUTER SYSTEMS

Includes computer networks.

N75-14488# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON EASTERN EUROPE: SCIENTIFIC AFFAIRS, NO. 444
13 Dec. 1974 20 p refs Transl. into ENGLISH from Eastern European reports
(JPRS-63664) Avail: NTIS HC $3.25

Articles dealing with development and progress in various theoretical and applied scientific disciplines and technical fields of East Europe are reported. The data also deals with the administration, structure, personnel, and research plans of leading East European scientific organizations and institutions, particularly the academies of sciences. Author

N75-14489# California Univ., Los Angeles.
FORMAL REQUIREMENTS FOR VIRTUALIZABLE THIRD GENERATION ARCHITECTURES
G. J. Popek and R. P. Goldberg (Honeywell Inform. Systems) 1974 14 p refs Presented at 4th Symp. on Operating System Principles, New York, 15-17 Oct. 1973
(Contracts AT(04-3)-34; F19628-70-C-0217)
(UCLA-10-P-14-120; Conf-731076-1) Avail: NTIS HC $3.25

Virtual machine systems were implemented on a limited number of third generation computer systems, such as CP-67 on the IBM 360/67. A model of a third generation-like computer system is developed, and formal techniques are used to derive precise sufficient conditions to test whether such an architecture can support virtual machines. Author

N75-14490# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
APPLICATIONS FOR PROGRAMMABLE EXTERNAL MODULES IN COMPUTERIZED PROCESS CONTROL SYSTEMS
W. Becker, P. Boese, G. Faerber, H. Guenther, H. Kalis, H. Seufert, K. Simon, and G. Ueberschaer May 1974 112 p In GERMAN
(KFK-PDV-23) Avail: AEC Depository Libraries HC $8.75

Dedicated systems for decentralized automation concepts are considered partly controlled subsystems in highly integrated electronic modules. External functional units are: (1) digital microprocessors; (2) digital microprogrammable processors; (3) DDA processors; and (4) analog functional elements. Transl. by G.G.

N75-14491# Kernforschungszentrum, Karlsruhe (West Germany). Inst. fuer Datenverabeitung in der Technik.
MODELS FOR ESTIMATION OF MESSAGE DELAYS IN COMPUTER NETWORK
R. Senger Apr. 1974 51 p refs In GERMAN; ENGLISH summary
(KFK-1972) Avail: AEC Depository Libraries HC $5.75

Computer network performance measured in terms of delays and response times depends strongly on the performance of the communication system available for inter-computer communications. The applicability of queuing theory to analysis and synthesis of computer network communication systems is reviewed. Conditions under which series and networks of queues are analytically tractable are discussed. As a way of more refined modelling, a simulation model for queuing networks was built, which proved to be helpful in analyzing problems where analytic solutions are not available. Author

N75-14492# Gesellschaft fuer Kernforschung m.b.H., Karlsruhe (West Germany).
COMPARISON OF REDUNDANCY REDUCTION ALGORITHMS WITH RESPECT TO SYSTEM PROTECTION USING PROCESS CONTROLLERS
R. F. W. Grimm Feb. 1974 80 p refs In GERMAN; ENGLISH summary
(KCK-PDV-17) Avail: AEC Depository Libraries HC $7.00

Automatic system protection using a process controller is described. System data collection is considered to be the main problem of system protection. Due to the limited storage capacity of the process controller the data have to be free of redundancy. Redundancy reduction algorithms were tested with six signals and were compared with respect to the main criteria: compression ratios, errors, and computer load. Four predictor and interpolar algorithms are shown to meet the criteria. Author

N75-14493# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
USE OF THE IBM 370-168 OF THE CIRCE FROM THE LAAS IBM 1130 TERMINAL [INTRODUCTION A L'UTILISATION DU 370-168 IBM DU CIRCE A PARTIR DU TERMINAL 1130 DU LAAS]
G. Bouyssou Apr. 1974 54 p In FRENCH and partly in ENGLISH
(LAAS-NT-SIS-74-T-15) Avail: NTIS HC $4.25

The IBM 370-168 is described briefly, and future plans for incrementation of the CIRCE computing power are outlined. Modifications and simplifications introduced in the control cards, especially JOB, EXEC, DD and MAIN, are detailed in manual user form. ESRO

N75-14494# Mitre Corp., McLean, Va.
SECURE COMPUTER SYSTEMS: A REFINEMENT OF THE MATHEMATICAL MODEL
D. Elliott Bell Apr. 1974 77 p refs
(Contract F19628-73-C-0001; AF Proj. 522G)
(AD-780528/6; MTR-2547-Vol-3; ESD-TR-73-278-Vol-3) Avail: NTIS HC $4.75 CSCL 09/2

A model developed for the investigation of security in computer systems is refined in three major ways: incorporating an object structure, a notion of current security level, and an altered property. Various ramifications of classifying a control structure are explored. It is shown that security requirements are fulfilled in a system using these refinements. Author (GRA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support.*

N75-14495*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CONSTRAINED OPTIMAL CONTROLLER FOR LINEAR SYSTEMS WITH STATE AND CONTROL DEPENDENT DISTURBANCE
S. Basuthakur Washington Jan. 1975 17 p refs
(NASA-TN-D-7763; G-7445) Avail: NTIS HC $3.25 CSCL 12A

The problem is posed with the additional constraints that the dynamic controller uses only noise-corrupted outputs, and that its dimension is significantly lower than that of a Kalman filter. The unknown disturbance is viewed as an adversary which tries to maximize a performance criterion: a criterion that the controller gains attempt to minimize. The optimal controller gains are determined by solving a nonlinear matrix two-point boundary value problem. Author

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N75-14496# Technische Universitaet, Munich (West Germany).
THE DESCRIPTION OF THE MECHANICAL BEHAVIOR OF POLYETHYLENES BY LINEAR DIFFERENTIAL EQUATIONS Ph.D. Thesis [DIE BESCHREIBUNG DES MECHANISCHEN VERHALTENS VON POLYAETHYLEN MIT LINEAREN DIFFERENTIALGLEICHUNGEN]
Heinrich Liertz 18 Dec. 1973 84 p refs In GERMAN
Avail: NTIS HC $4.75

The viscoelastic behavior of polyethylenes is expressed by linear differential equations for the following conditions: oscillations, creep, tensile stress at constant tension velocity, tensile stress at constant elongation velocity, and relaxation. Results show that the creep model and the tangent model for tensile tests at constant tension velocity agree exactly with each other, and that the relaxation model and the tanget model are identical for tensile tests at constant elongation velocities.
Transl. by G.G.

N75-14497*# California State Coll., Fullerton.
ANALYSIS AND OPTIMIZATION OF CYCLIC METHODS FOR APPLICATION IN ORBIT COMPUTATIONS Final Report, Jul. 1972 - Jul. 1974
Sam Pierce Sep. 1974 47 p refs Revised
(Grant NGR-05-071-005)
(NASA-CR-132826) Avail: NTIS HC $3.75 CSCL 12A

Numerical methods for integrating ordinary differential equations of the traditional and cyclic methods are mathematically and computationally analyzed. Error growth and stability are optimized for application to orbit computation problems. Author

N75-14498# Sandia Labs., Albuquerque, N.Mex.
APPLICATION OF PREDICTOR-CORRECTOR ALGORITHMS TO THE DIRECT INTEGRATION OF SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS
D. C. Williams Jun. 1974 79 p refs
(Contract AT(29-1)-789)
(SLA-73-0058) Avail: NTIS HC $4.75

Many predictor-corrector methods for solving the initial-value problem require that systems of order two be broken down into first-order systems. A simple means is described for the modification of many such algorithms to permit the direct integration of higher-order systems. Experimental results are presented to illustrate the application of the suggested approach on the Adams-Bashforth-Moulton methods of order 4-12. The effect upon both stability and accuracy is discussed. Methods in which the order of the corrector is one higher than the order of the predictor are also considered. Results are given for the application of the approach to another less familiar method. These were obtained using general purpose, production integrators suitable for nonstiff problems. Author

N75-14499# Battelle Pacific Northwest Labs., Richland, Wash.
CONVERGENCE OF THE DISCRETE ORDINATES METHOD FOR THE TRANSPORT EQUATION
P. M. Anselone and A. G. Gibbs 1974 27 p refs Presented at the Conf. on Constructive and Computational Methods in Differential and Integral Equations, Bloomington, Ind., Feb. 1974 Sponsored by AEC
(BNWL-SA-5016; Conf-740229-1) Avail: NTIS HC $3.75

Convergence theorems are obtained for certain transport problems involving anisotropic scattering, other geometrics, and time dependence. These contributions are surveyed in order to isolate what is essential to the convergence of the discrete ordinates approximations. Methods of analysis are developed which appear to be applicable to very general transport problems and to other integro-differential equations. The discussion is in terms of a sequence of model problems of increasing complexity. All functions considered are real. Specified functions are continuous and usually nonnegative. The problems surveyed involve, discrete ordinates approximations only for the angular integrals, and do not represent the most general case of discretization, as practiced, in many nuclear reactor applications where the spatial variable is also discretized. NSA

N75-14500# California Univ., Livermore. Lawrence Livermore Lab.
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: LECTURE NOTES
A. C. Hindmarsh Jun. 1974 222 p refs
(Contract W-7405-eng-48)
(UCID-16558) Avail: NTIS HC $7.25

A numerical solution of the initial value problem for ordinary differential equations is presented. Euler, Runge-Kutta, and linear multistep methods are discussed along with Stiff problems and approaches to their solution. J.M.S.

N75-14501# Sandia Labs., Albuquerque, N.Mex.
CURVE FITTING BY POLYNOMIALS IN ONE VARIABLE
L. F. Shampine, S. M. Davenport, and R. E. Huddleston Jun. 1974 28 p refs
(Contract AT(29-1)-789)
(SLA-74-270) Avail: NTIS HC $3.75

Polynomial fitting and evaluation are performed by the subroutines: POLFIT, PVALUE, and PCOEF. The subroutine ORSTAT performed statistical tests to determine the degree of polynomial needed to fit the data. ORSTAT was merged into POLFIT but primary support of the codes remains as for the original conception. The subroutine POLFIT calculated the fitting polynomials according to several criteria permitted to the user. The resulting fits are in orthogonal polynomial form. The subroutine PVALUE is used to evaluate the fitted polynomial and its derivatives. The subroutine PCOEF expressed the polynomial fits as powers of (x-c) for any specified point c. Each routine is discussed and examples of its use are furnished. Author

N75-14502# Oak Ridge National Lab., Tenn.
NUMERICAL SOLUTION OF ILL-CONDITIONED SYSTEMS OF LINEAR EQUATIONS

M. T. Heath Jul. 1974 55 p refs
(Contract W-7405-eng-26)
(ORNL-4957) Avail: NTIS HC $4.25

The theoretical origins of ill-posed problems are discussed, and the conditional difficulties involved in their solution are examined. An iterative suboptimal constrained estimation method for solving this type problem is presented. Several related methods are surveyed. Author

N75-14503# Central Research Inst. for Physics, Budapest (Hungary).
UNIVERSAL ALGEBRAIC CONSTRUCTION OF LOGICS
H. Andreka, I. Nemeti, and T. Gergely 1974 76 p refs
(KFKI-74-41) Avail: AEC Depository Libraries HC $7.00

The construction of a mathematical base for a general theory of logics is reported. The frame is developed completely inside universal algebra, that is the objects treated in the general theory of logics, as well as their standard properties completeness and reducibility, are completely algebraic. To illustrate the general methodology the following tree of logics is constructed: grown from the root logic, typeless logic, logic of type t and the hierarchy of logics with built-in shorthands, as variable symbols. The commonly used alternative of classical first-order logic is a node of this tree. Two generalizations of first order logics of finitary structures to the first order logics of infinitary structures are introduced and their logic properties are investigated. This class of logics can be used effectively for a program verifier. The main result of this study is the purely algebraic proof of the completeness theorem. Author

N75-14504# Gesellschaft fuer Mathematik und Datenverarbeitung, Bonn (West Germany).
MODIFIED RITZ METHOD IN BANACH SPACES [MODIFIZIERTE RITZ VERFAHREN IN BANACHRAEUMEN]
Bruno Braunleder (Bonn Univ.) 1974 46 p refs In GERMAN
(BMFT-GMD-85) Avail: NTIS HC $3.75

The Ritz averaging method was applied for a Banach space. The modified Ritz method was derived for self adjoined operators, for normal operators, and for linear operators. Examples for the choice of the g function are given. The following linear operators in a Banach space E are dealt with: operators for which an operator calculus applies and operators that can be characterized by their Banach adjoints. Predictions on operators with a suitable range of numerical values are made. Numerical analyses, using an IBM 370-165 computer, of an unlimited operator in Hilbert space and of a limited operator are given. ESRO

N75-14505# Gesellschaft fuer Mathematik und Datenverarbeitung, Bonn (West Germany).
ALGEBRAIC CHARACTERIZATION OF CUMULATIVE AUTOMATA ARRAYS [ALGEBRAISCHE CHARAKTERISIERUNG ADDITIVER AUTOMATEN-ARRAYS]
Wolfgang Merzenich (Dortmund Univ., West Ger.) 1974 36 p refs In GERMAN Sponsored jointly by Bundesmin. fuer Forsch. und Technol. and Landesamt fuer Forsch. des Landes Nordrhein-Westfalen
(BMFT-GMD-88) Avail: NTIS HC $3.75

The properties of the global transformation, determined by local transition, were considered. An algebraic formulation of the concept of automata arrays is presented. The concept of local transition with additional structure is introduced, and the conditions under which the global transformation obtains a structure were investigated. The case in which the local transition possesses a cumulative structure is considered. The global transformation can be represented by a sum of morphisms. The class of all cumulative global transformations of a given configuration space can be represented by an appropriate group semiring. ESRO

N75-14506# Gesellschaft fuer Mathematik und Datenverarbeitung, Bonn (West Germany). Inst. fuer Angewandte Mathematik.
OPTIMAL ESTIMATIONS OF POLYNOMIAL ZEROES AND POLYNOMIAL COEFFICIENTS WITH APPLICATION TO THE GRAEFFE AND NICKEL METHODS [OPTIMALE ABSCHAETZUNGENN VON POLYNOMNULLSTELLEN UND POLYNOMKOEFFIZIENTEN MIT ANWENDUNGEN AUF DIE VERFAHREN VON GRAEFFE UND NICKEL]
Gerhard Schroeder 1974 59 p refs In GERMAN Sponsored jointly by Bundesmin. fuer Forsch. und Technol. and Landesamt fuer Forsch. des Landes Nordrhein-Westfalen
(BMFT-GMD-89) Avail: NTIS HC $4.25

The problem of finding an indication about the position of all the roots of an arbitrary n-polynomial with real or complex coefficients is dealt with. It was necessary to have numerical methods providing good approximate values for the single zeroes and estimates of the distance between zeroes and approximation values. In order to estimate the polynomial zeroes, Newtonian rise and main indices were employed. The method is applied to the Graeffe and Nickel methods. ESRO

N75-14507# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
STUDY OF A CLASS OF LIMIT DISTRIBUTIONS [ETUDE D'UNE CLASSE DE DISTRIBUTIONS LIMITES]
G. Banon and A. Fournie 1974 22 p refs In FRENCH
(LAAS-74-I-25) Avail: NTIS HC $3.25

The probability density was studied for the output at time k of a discrete, linear, dynamic system, completely known and initially at rest submitted at time zero to a random input uniformly spread between plus or minus 0.5. A formulation of the probability density is given as a function of the system impulse response. Some properties of the density function were analyzed. For first order systems, limit density is shown to satisfy a differential equation. Numerical results obtained by computer programming of the differential equation algorithm are given. ESRO

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N75-14508# Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.
STATISTICAL ANALYSIS OF IMPACT POINTS OF ROCKETS
Yasunori Matogawa, Motoki Hinada, and Kohko Fukuda Dec. 1974 15 p refs
(ISAS-520-Vol-39-No-17) Avail: NTIS HC $3.25

Data of impact points obtained from rocket vehicles launched at KSC are statistically analyzed on the basis of the normal bivariate distribution method. Results obtained by the binormal method are compared with those obtained by the empirical method. Circular distribution method is shown to be valid if the level of significance is appropriately chosen. Some computations related to the determination of impact zones are carried out. Author

N75-14509# Argonne National Lab., Ill.
MONTE CARLO WORK AT ARGONNE NATIONAL LABORATORY
E. M. Gelbard and R. E. Prael Jul. 1974 34 p refs Presented at Monte Carlo Conf., Argonne, Ill. 1-3 Jul. 1974 Sponsored by AEC
(Conf-740710-3) Avail: NTIS HC $3.75

A simple model of the Monte Carlo process is described and a nonlinear recursion relation between fission sources in successive generations was developed. From the linearized form of these recursion relations, it is possible to derive expressions for the mean square coefficients of error modes in the iterates and for correlation coefficients between fluctuations in successive generations. In a simple test problem, it was found that MacMillan's prescription for computing variances in means is fairly accurate. First-order nonlinear terms in the recursion relation were considered from which an expression for the bias in the eigenvalue estimator was derived, and prescriptions for measuring the bias were formulated. Plans for the development of the VIM code are outlined and the proposed treatment of small sample perturbations in VIM are briefly described. Author (NSA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N75-14510*# Virginia Univ., Charlottesville. Research Labs. for Engineering Sciences.
INDIRECT SYNTHESIS OF MULTI-DEGREE OF FREEDOM TRANSIENT SYSTEMS Final Report
Walter D. Pilkey and Y. H. Chen Sep. 1974 25 p refs
(Grant NGR-47-005-145; Proj. 4085-2320)
(NASA-CR-141061; ESS-4085-110-74) Avail: NTIS HC $3.25 CSCL 05H

An indirect synthesis method is used in the efficient optimal design of multi-degree of freedom, multi-design element, nonlinear, transient systems. A limiting performance analysis which requires linear programming for a kinematically linear system is presented. The system is selected using system identification methods such that the designed system responds as closely as possible to the limiting performance. The efficiency is a result of the method avoiding the repetitive systems analyses accompanying other numerical optimization methods. Author

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N75-14511# Technische Universitaet, Hanover (West Germany).
THE THEOREM OF THE BOUNDARY PRINCIPLE AND RELATED PROBLEMS WITH MULTIPLE VARIABLES Ph.D. Thesis [DER SATZ VOM PRINZIP DES RANDES UND VERWANDTE PROBLEME BEI MEHREREN VARIABLEN]
Volker-Ruediger Kasten Feb. 1974 70 p refs In GERMAN
Avail: NTIS HC $4.25

The principle of the boundary is applied to holomorphic mapping of analytical quantities. It is shown that the generalized boundary principle applies to definite complex spaces as well as to dimensions of meromorphic functions and also to the number of elements in fibers. Transl. by G.G.

N75-14512# Illinois Univ., Chicago. Dept. of Information Engineering.
DECISION THEORY METHOD FOR THE ANALYSIS OF TEXTURE
B. H. McCormick and S. N. Jayaramamurthy 1974 61 p refs
(Contract AT(11-1)-2118)
(TID-26598) Avail: NTIS HC $4.25

A decision theory method (DTM), based on the principles of statistical decision theory, is presented for the analysis of texture. A wide range of problems involving either statistical or structural textures is included. The ability of DTM to perform scene segmentation using textural information, edge/border detection, and to provide discrimination/recognition is demonstrated with examples. Generation of 2-D filters that act as textural feature detectors is illustrated with the help of interval covering theory. Author

N75-14528 Laboratoire de Physique Theorique et Particules Elementaires, Orsay (France).
ELEMENTS OF GROUP THEORY FOR GAUGE MODELS
Michel Gourdin *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 329-343 refs (For availability see N75-14514 05-70)

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N75-14513 Polish Academy of Sciences, Warsaw.
MATHEMATICAL PROBLEM OF ELECTROMAGNETIC SOUNDING OF FORMATIONS [ZAGADNIENIA MATEMATYCZNE ELEKTROMAGNETYCZNEGO SONDOWANIA GOROTWORU]
Andrzej J. Turski 1974 21 p refs In POLISH
(Rept-12/1974) Avail: Issuing Activity

Geological sounding with an electromagnetic field and the equipment used in the process are discussed. The measuring equipment is made up of a transmitting system working in the frequency range from 5 to 50 kHz, sometimes even to 1 kHz, and sensitive receivers. The electromagnetic inverse problems which lead to the determination of position and size of the conductive objects in given areas on the basis of field measurements in the boundary's accessible sections are also presented. A method for expanding the measurement results in an unaccessible area was investigated. Transl. by M.J.S.

N75-14514# Centre National de la Recherche Scientifique, Orsay (France).
ELECTROMAGNETIC AND WEAK INTERACTIONS, VOLUME 1
J. Tran ThanhVan, ed. 1973 392 p refs Presented at Proc. of the 1st Sess. of the 8th Rencontre de Moriond, Meribel-les-Allues, France, 4-16 Mar. 1973
Avail: NTIS HC $10.25

Summaries are given of conference material presented on current theoretical and experimental developments in electromagnetic interactions and elementary particles. For individual titles, see N75-14515 through N75-14530.

N75-14515 Rome Univ. (Italy).
A SUGGESTION CONCERNING INCLUSIVE STUDIES IN POSITRON ELECTRON REACTIONS
Carlo Bernardini *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 23-27 refs (For availability see N75-14514 05-70)

Inclusive reactions with e(+)e(-) colliding beams are studied using one particle inclusive cross sections. Author

N75-14516 European Organization for Nuclear Research, Geneva (Switzerland).
RESONANCES IN HIGH ENERGY COLLIDING LEPTON BEAMS c73
John L. Rosner *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 29-40 refs (For availability see N75-14514 05-70)

Tests for higher symmetries such as SU(6) are provided by several suggested experiments in colliding lepton beams. These experiments test for physical properties learned from the helicity distribution of omega mesons in B yields omega meson pion. Author

N75-14517 Paris Univ., Orsay (France).
ELECTRON-POSITRON INTERACTIONS AT E SUB CM EQUALS 4 GeV AT THE CAMBRIDGE ELECTRON ACCELERATOR c73
Ronald Madaras *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 41-72 refs (For availability see N75-14514 05-70)

Some results of the experiment performed at ECM = 4 GeV are presented. In this experiment, the large solid angle, nonmagnetic detector BOLD was used to detect both electromagnetic and hadronic final states from electron-positron interactions. The measurement of e(+)e(-) yields e(+)e(-) and e(+)e(-) yields gamma gamma gives the best test to date of the validity of QED at large momentum transfers, and the measurement of e(+)e(-) yields multi-hadrons gives a total cross section which is much higher than that for e(+)e(-) yields positive muon negative muon. Author

N75-14518 Laboratoire de Physique Theorique et Particules Elementaires, Orsay (France).
INELASTIC ELECTRON-POSITRON SCATTERING c73
Michel Gourdin *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 73-78 refs (For availability see N75-14514 05-70)

The two-photon exchange in the inelastic Bhabha scattering e(+)e(-) yields e(+)e(-) + anything is studied without the quasi real photon approximation. Author

N75-14519 Universite des Sciences et Techniques de Lille (France). Dept. de Physique Mathematique.
STRUCTURES IN POSITRON ELECTRON ANNIHILATION: HIGHER VECTOR MESONS OR INELASTIC EFFECTS **c73**
Fernand-Michel Renard *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 79-100 refs (For availability see N75-14514 05-70)

The structures observed between 1 and 2 Gev in the pion form factor as well as in the e(+)e(-) annihilation into many hadrons are analyzed in two different manners: (1) by postulating the existence of higher vector mesons or (2) by using a new rho meson propagator which incorporates in a simple way the effects of an energy dependant width and of a strong inelasticity. Author

N75-14520 Rome Univ. (Italy).
THEORETICAL IDEAS ABOUT ONE PARTICLE INCLUSIVE REACTIONS INDUCED BY LEPTONS **c73**
Guido Altarelli *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 101-123 refs (For availability see N75-14514 05-70)

A general review is presented of the main theoretical ideas concerning processes of the form L + N yields L prime + h + all e(+)e(-) yields h + all where L is a lepton and h a hadron. Author

N75-14521 Paris Univ., Orsay (France).
THE ORSAY MAGNETIC DETECTOR **c35**
Alain Quenzer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 125-133 refs (For availability see N75-14514 05-70)

A description is given of a magnetic detector which will first be used on the present Orsay electron-positron storage ring (ACO), and then, with some possible additions, on the future Orsay high luminosity ring (DCI). A major feature of this magnetic detector is the use of cylindrical proportional wire chambers of very low mass (.001 radiation lengths). These chambers have both anode and cathode detection, which permits simultaneous axial and azimuthal measurements without ambiguity. After describing the detector, data are given on its expected performance and the physics program planned for it on ACO. Author

N75-14522 Deutsches Elektronen-Synchrotron, Hamburg (West Germany).
EXPERIMENTAL RESULTS ON HYDRON PRODUCTION IN INELASTIC ELECTRON SCATTERING **c73**
Henrich Meyer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 135-180 refs (For availability see N75-14514 05-70)

Results are reported on electroproduction and photoproduction in the following areas: inclusive production of protons, pions, and kaons, electroproduction of mesons, and charged hadron multiplicity distribution. Author

N75-14523 Deutsches Elektronen-Synchrotron, Hamburg (West Germany).
GENERALIZED VECTOR DOMINANCE **c73**
Dieter Schildknecht *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 181-234 refs (For availability see N75-14514 05-70)

Predictions of the vector dominance model are compared with the photoproduction and the e(+)e(-) annihilation data. Interpretation of the deep inelastic data is given in the framework of a generalized vector dominance model. Author

N75-14524 Budapest Science Univ. (Hungary). Dept. of Physics.
LIGHT CONE PHYSICS AND THE PARTON MODEL: GENERAL ASPECTS AND APPLICATIONS **c73**
Julius Kuti *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 235-268 refs (For availability see N75-14514 05-70)

General aspects of light cone physics and the quark parton model are discussed for deep inelastic lepton-nucleon scattering. The particular importance of neutrino (antineutrino) beams and the spin-dependence of inelastic electron-nucleon scattering are emphasized. Author

N75-14525 Ecole Polytechnique, Paris (France).
PRELIMINARY RESULTS ON ANTINEUTRINO AND NEUTRINO TOTAL CROSS-SECTIONS **c73**
Maurice Haguenauer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 269-280 refs (For availability see N75-14514 05-70)

The neutrino and antineutrino total cross sections and their ratio were measured. The results are found compatible with the quark-parton model. Author

N75-14526 Paris Univ., Orsay (France).
EXPERIMENTAL RESEARCH OF NEUTRAL CURRENTS IN NEUTRINO INTERACTIONS
A. M. Lutz-Burban *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 281-304 ref (For availability see N75-14514 05-70)

Attempts were made to observe some neutrino interactions for which neutral currents contribution are necessary. Several methods-Weinberg's theory, Giorgi-Glashew's theory, Lee Prentki Zamino, and the Monte Carlo method-are discussed. Author

N75-14527 Laboratoire de Physique Theorique et des Hautes Energies, Orsay (France).
YANG-MILLS MODELS OF WEAK AND ELECTROMAGNETIC INTERACTIONS
Jean Iliopoulos *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 305-327 refs (For availability see N75-14514 05-70)

A brief review is presented of the unified renormalizable models of the weak and electromagnetic interactions. Author

N75-14528 Laboratoire de Physique Theorique et Particules Elementaires, Orsay (France).
ELEMENTS OF GROUP THEORY FOR GAUGE MODELS **c67**
Michel Gourdin *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 329-343 refs (For availability see N75-14514 05-70)

Lie algebra techniques used in the gauge theories with Yang-Mills fields and the Higgs mechanism are explained. Author

N75-14529 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette (France).
HIGHER ORDER CALCULATIONS IN GAUGE THEORIES **c73**
Benni Lautrup *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 345-377 refs (For availability see N75-14514 05-70)

The results of various one loop calculations in unified gauge theories of weak and electromagnetic interactions are discussed. Data are concentrated almost entirely upon the purely leptonic sector while calculations are limited to the finite parts which were already evaluated. These calculations include anomalous magnetic moment of the leptons, the static electromagnetic properties of the intermediate vector bosons, elastic neutrino-electron scattering, and the corrections to the decay rate of the muon. Author

N75-14530 Laboratoire de Physique Theorique et des Hautes Energies, Paris (France).
ON SEARCHING FOR CHARM PARTICLES **c73**
George A. Snow *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 379-390 refs (For availability see N75-14514 05-70)

Problems involved in the search for massive charmed hadrons are discussed. The importance of the ratio of leptonic to nonleptonic decays for these particles is stressed. Several possible experimental approaches are outlined. Author

N75-14531# Wuerzburg Univ. (West Germany).
THE APPLICATION OF HIGH MAGNETIC FIELDS IN SEMICONDUCTOR PHYSICS
Aug. 1974 813 p refs Presented at Intern. Conf., Wuerzburg, West Germany, 24 Jul. - 2 Aug. 1974
Avail: NTIS HC $19.25

This conference was held to discuss new results in semiconductor physics which are characterized by the common tool of

magnetic field which was employed to obtain them. For individual titles, see N75-14532 through N75-14563.

N75-14532 California Univ., Irvine.
SURFACE POLARITONS IN HIGH MAGNETIC FIELDS
R. F. Wallis *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 1-45 refs (For availability see N75-14531 05-70)
(Contract N00014-69-A-0200-9003)

An elementary theoretical discussion is given of surface polaritons for an isotropic dielectric medium with a planar surface. Also discussed is the effect of a magnetic field on surface polaritons associated with surface plasmons. Results are presented for n-type InSb, which has a single type of free carrier, and for p-type PbTe, which has multiple carriers. The effect of the interaction of surface magnetoplasmons with surface optical phonons and the influence of depletion layers are discussed. Author

N75-14533 Naval Research Lab., Washington, D.C.
MAGNETO-OPTICAL STUDIES OF SURFACE POLARITONS ON InSb **c76**
E. D. Palik and A. Hartstein (Pennsylvania Univ., Philadelphia) *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 46-82 refs (For availability see N75-14531 05-70)

The attenuated total reflection spectrum due to surface polaritons on n-type InSb has been investigated in detail. The zero magnetic field H properties of such surface modes are reviewed. A steady external magnetic field is applied to the sample in two geometries; wave vector k of the surface mode and H both parallel to the surface with H either parallel or perpendicular to k. Author

N75-14534 Katholieke Universiteit te Leuven (Belgium).
MEGAGAUSS GENERATORS FOR APPLICATION TO SOLID STATE EXPERIMENTS
Fritz Herlach *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 84-119 refs (For availability see N75-14531 05-70)

Several types of Megagauss generators capable of generating ultrahigh magnetic fields are discussed, and examples of their application in solid state experiments are described. A.L.

N75-14535 Max-Planck-Institut fuer Festkoerperforschung, Grenoble (France).
THE MAGNETIC FIELD FACILITY IN GRENOBLE **c09**
H.-J. Schneider-Muntau *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 120-145 refs (For availability see N75-14531 05-70)

A general description is given, of the High Field Magnet Laboratory in Grenoble, of the technical installations such as power supply and cooling systems and of the magnets available, their performance and their characteristic data. Future plans are discussed to increase the fields of watercooled magnets available in the laboratory adopting a different principle, the helix magnet. The arguments for and against helix magnets in comparison to Bitter magnets, are explained and are followed by a description of the results of preliminary calculations. Author

N75-14536 Naval Research Lab., Washington, D.C.
ELECTRIC DIPOLE SPIN-FLIP RESONANCES IN SEMICONDUCTORS **c76**
B. D. McCombe *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 146-187 refs (For availability see N75-14531 05-70)

Theoretical and experimental results are described for spin-flip resonances pertinent to the conduction band of zincblende semiconductors and for valence bands of diamond and zincblende semiconductors under uniaxial stress. Energy levels and optical selection rules for free electrons in a magnetic field are derived. The necessary extensions to include real crystal effects (periodic crystal potential) are discussed. Spin-flip resonances in some materials other than diamonds and zincblende are briefly described. Author

N75-14537 Wuerzburg Univ. (West Germany). Physikalisches Inst.
SURFACE QUANTUM OSCILLATIONS IN SEMICONDUCTORS **c76**
G. Landwehr *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 188-220 refs (For availability see N75-14531 05-70)

Experiments were performed using linear field effect transistors having a Hall geometry which allowed determination of the surface carrier concentration in the space charge region independent of the alternative method which makes use of a number of induced carriers. The magnetic fields up to 10.5 Tesla were generated with a superconducting coil. Fields up to 15 Tesla were produced in water-cooled Bitter coils. Data were taken between 1.4 and 4.2 K. The channel resistance was measured at constant current conditions. As a result of these experiments, considerable progress has been made in the understanding of the properties of p-type inversion layers on silicon and that the gross features of electric subbands in accumulation layers on tellurium can be at least qualitatively explained. Author

N75-14538 Massachusetts Inst. of Tech., Cambridge. Francis Bitter National Magnet Lab.
THE SPIN-FLIP RAMAN LASER **c36**
M. H. Weiler, R. L. Aggarwal, and B. Lax *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 221-239 refs (For availability see N75-14531 05-70)

Both theoretical treatments and experiments in various materials are included in a historical review of stimulated spin-flip Raman scattering. Recent theoretical and experimental progress for the InSb Raman laser is discussed. Present and future applications are described. Author

N75-14539 London Univ. (England). Dept. of Mathematics.
TRANSPORT PROPERTIES OF POLAR SEMICONDUCTORS IN A MAGNETIC FIELD **c76**
E. H. Sondheimer *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 240-248 refs (For availability see N75-14531 05-70)

It is an established fact that in weakly polar III-V semiconductors such as GaAs, there is a considerable intermediate temperature range in which the dominant scattering of the electrons is by longitudinal optical phonons (polarization waves). Moreover, in these materials the electron-phonon coupling is sufficiently weak that polaron effects can be neglected in the theory of transport and a semiclassical Boltzmann equation used with transition probabilities determined by perturbation theory. This approach can also be used to treat transport effects in a magnetic field, so long as there is no interest in quantum effects depending upon the existence of Landau levels. In the simplest model the optical phonons are assumed to have a constant frequency, the electrons are non-degenerate and occupy a single spherically symmetric parabolic energy band, and the electron-phonon interaction is measured by a dimensionless coupling constant. Mobilities in pure expitaxial GaAs can be as high as 200,000 sq cm/V sec. The theory of transport for this model needs to be formulated with care, because the energy gained or lost by an electron in absorbing or emitting an optical phonon is large compared to the mean thermal energy, and for such highly inelastic scattering the collision process is non-local in k-space. Author

N75-14540 Ecole Normale Superieure, Paris (France). Groupe de Physique des Solides.
ZERO-GAP SEMICONDUCTORS IN HIGH MAGNETIC FIELDS **c76**
Wlodek Zawadzki *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 249-256 refs (For availability see N75-14531 05-70)

The k sub z dependence of magnetic sub-bands in alpha-Sn and HgTe was studied theoretically using the method of Luttinger. It was demonstrated that the external field opens a gap of forbidden energies in these zero-gap semiconductors. The magnetic sub-band structure was shown to depend strongly on the field orientation. These effects are discussed in connection with high field transport and optical phenomena. It is demonstrated that a transverse electric field acts to increase the magnetically induced gap in alpha-Sn and to decrease it in HgTe. Author

N75-14541 Oxford Univ. (England). Clarendon Lab.
QUANTUM TRANSPORT AND INFRARED SPECTROSCOPY OF SEMICONDUCTORS c76
R. A. Stradling *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 257-271 refs (For availability see N75-14531 05-70)

Recent high-field activities and experiments carried out by the Semiconductor Group at Oxford and the Pulsed Magnetic Field Group at Toulouse included: (1) the magnetophonon effect; (2) Fourier analysis of quantum resistance peaks; (3) electric freeze-out of carriers on to trap states in MOS devices; (4) cyclotron resonance of holes in III-V compounds; (5) cyclotron resonance of the electrons in GaP; (6) far infrared cyclotron absorption in Pb(1-x)Sn(x)Te and Pb(1-x)Sn(x)Se; and (7) transitions between excited states observed in Zeeman spectroscopy of the shallow donor impurities of III-V and II-VI semiconductors. Author

N75-14542 Osaka Univ. (Japan). Dept. of Material Physics.
FAR-INFRARED CYCLOTRON RESONANCE IN CdS UNDER INTENSE MAGNETIC FIELDS
S. Narita *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 272-294 refs (For availability see N75-14531 05-70)

Instrumentation for the measurement of the far infrared cyclotron resonance in CdS is described. Various far infrared measurement techniques have been developed in recent years with popularizations of far infrared molecular gas lasers. Two kinds of lasers were used: an H2O laser of 119 micron wavelength and the other an HCN laser of 337 micron wavelength. The cyclotron mass in CdS is about 0.2 of the free electron mass. Therefore, in the far-infrared cyclotron resonance by the use of H2O laser, a high magnetic field up to about 300 KOe is required. An electromagnet and lasers both were used in pulsed operation. Author

N75-14543 Edinburgh Univ. (Scotland).
LINE SHAPES IN DONOR SPECTRA AT HIGH MAGNETIC FIELDS
David M. Larsen *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 295-314 refs (For availability see N75-14531 05-70)

Results of spectroscopic analysis of isolated donor atoms in the simplest semiconductors are discussed. GaAs is an example of a semiconductor which is simple and can be highly purified. This material, when n-type, invariably contains donor impurities which, at low temperatures bind electrons in shallow hydrogenic states whose energies are quite accurately described by eigenvalues of a hydrogenic Hamiltonian. Because of their size and small binding energy these atoms are much more easily perturbed by external fields than a hydrogen atom in vacuum would be. In particular an applied field of 50 or 100 kG very strongly disturbs the wave functions of donor hydrogenic atoms in GaAs. The extremely narrow transition lines in InSb at high magnetic fields are also briefly discussed. Author

N75-14544 Max-Planck-Institut fuer Festkoerperforschung, Stuttgart (West Germany).
DEGENERATE EXCITONS IN ZINCBLENDE TYPE CRYSTALS IN A MAGNETIC FIELD c73
K. Cho *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 315-338 refs (For availability see N75-14531 05-70)

Recent developments of the magneto-optical investigations of the excitons arising from the degenerate band edges are reviewed from both theoretical and experimental points of view. Author

N75-14545 Max-Planck-Institut fuer Festkoerperforschung, Grenoble (France).
RADIATIVE RECOMBINATION OF BOUND EXCITATIONS IN SEMICONDUCTORS WITH Td-SYMMETRY IN MAGNETIC FIELDS c76
Dieter Bimberg *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 339-369 refs (For availability see N75-14531 05-70)

A presentation is given of a naive picture of electron hole-pairs bound to different kinds of charged or neutral impurities. Two types of experimental setups are shown to give a feeling for the complications which are involved with luminescence experiments since such experiments have provided the most successful technique for making these centers evident. Some selected experimental results are given as examples for different kinds of bound excitons. Finally some very recent unpublished results are presented to demonstrate the limits of the models used and to emphasize how much work still has to be done to reach a full theoretical understanding of these systems. Author

N75-14546 Osaka Univ. (Japan). Dept. of Physics.
DIELECTRIC CONSTANT, CARRIER DENSITY AND BAND PARAMETERS BY MAGNETOPLASMA WAVES c75
Hajimu Kawamura *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 370-381 refs (For availability see N75-14531 05-70)

The simultaneous determination of carrier concentration and lattice dielectric constant of Pb(1-x)Sn(x)Te is described by observing the reflectance of microwaves under strong magnetic fields. The observed carrier dependence of lattice dielectric constant is discussed in connection with the softening of TO-phonon. Author

N75-14547 Vrije Universiteit, Amsterdam (Netherlands). Natuurkundig Lab.
CYCLOTRON-RESONANCE LINE WIDTH AS A TRANSPORT PROPERTY c73
A. Lodder *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 382-385 refs (For availability see N75-14531 05-70)

The cyclotron resonance line width (CRLW) at very low temperatures, and particularly its magnetic field dependence, is an important tool in the study of the scattering mechanism for electrons with impurities. In 1967 Kawabata pointed out that the CRLW is a typical transport property: in the expression for the CRLW gain and loss factors must be included. From the general theory an expression for the CRLW is given which combines the features of the expressions given by Kawabata and by Shin et al. It was concluded that the CRLW decreases with increasing magnetic field. The experimental results for the magnetic field dependence of the CRLW are not conclusive and further research on this subject is justified. Author

N75-14548 Massachusetts Inst. of Tech., Cambridge. Francis Bitter National Magnet Lab.
FAR INFRARED TUNABLE RADIATION SOURCES AND THEIR APPLICATIONS FOR HIGH MAGNETIC FIELD EXPERIMENTS
R. L. Aggarwal and B. Lax *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 386-419 refs Sponsored by ONR and NSF (For availability see N75-14531 05-70)

A review is given of several tunable or quasi-tunable far infrared radiation (FIR) sources. These include intense relativistic electron beams, impact-ionized electrons in Landau states of semiconductors, Josephson junctions and particular emphasis is placed on the difference-frequency mixing which can provide broadband tunable coherent radiation. Important applications such as FIR spectroscopy, plasma diagnosis and optical communication are also discussed. Author

N75-14549 Technische Hochschule, Aachen (West Germany). Physikalisches Inst. der Rheinisch-Westfaelischen. Tech. Hochschule.
THE FARADAY EFFECT IN TELLURIUM IN HIGH MAGNETIC FIELDS
M. Lutz *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 420-436 refs (For availability see N75-14531 05-70)

The Faraday effect is a very convenient method to study the optical properties of semiconductors in a wide spectral range and has been used to investigate the bandstructure of various semiconductors. Faraday experiments in tellurium which were performed in magnetic fields up to 15 T are described. Author

N75-14550 Oxford Univ. (England). Clarendon Lab.
POLARON EFFECTS IN SEMICONDUCTORS c76
K. K. Bajaj *In* Wuerzburg Univ. The Appl. of High Magnetic

Fields In Semicond. Phys. Aug. 1974 p 437-446 refs (For availability see N75-14531 05-70)

Some phenomena in polar semiconductors where the explicit polaron effects appear to play an important role are discussed. The discussion is confined to the study of two topics, namely, the behavior of polarons in the presence of an external magnetic field and the behavior of a few low-lying energy levels of a polaron bound to an impurity center through a Coulomb potential both in the absence and in the presence of a magnetic field. Author

N75-14551 Massachusetts Inst. of Tech., Cambridge. Francis Bitter National Magnet Lab.

RAMAN SCATTERING IN MAGNETIC SEMICONDUCTORS: EuS AND EuSe **c76**

V. J. Tekippe, R. P. Silberstein, M. S. Dresselhaus, and R. L. Aggarwal *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 449-469 refs Sponsored by NSF (For availability see N75-14531 05-70)

The anomalous first-order Raman scattering observed in the magnetic semiconductors EuS and EuSe is reviewed. The experimental results show a broad asymmetric line in the region from omega TO to omega LO in the paramagnetic phase and sharp-line resonant Raman scattering at omega LO in the ferromagnetically ordered state. A qualitative interpretation of these results is given in terms of a spin order-disorder argument in which the spin structure of these compounds is explicitly included in the symmetry analysis. The predictions of the above argument with regard to the temperature and magnetic field dependence of the Raman scattering are shown to be in good agreement with the experimental results. A comparison is also made between the excitation energy dependence of the sharp-line resonant Raman scattering and the magneto-reflectivity spectra of EuSe and EuS. Author

N75-14552 Wien Univ. (Austria). Ludwig Boltzmann Inst. fuer Festkoerperphysik.

MAGNETOTRANSPORT PROPERTIES OF n-TYPE GaAs IN THE HOPPING RANGE **c76**

H. Kahlert *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 470-485 (For availability see N75-14531 05-70)

It appears that the predictions of percolation theory applied to the problem of impurity hopping in lightly doped semiconductors could be verified satisfactorily by measurements of the resistivity of n-type GaAs and its dependence on the magnetic field strength. Quantitative agreement was obtained for the dependence of the resistivity on the donor concentration and on a moderate magnetic field. For the case of strong magnetic fields a further refinement of the theory is required to establish an exact value for the numerical coefficient. Author

N75-14553 Polish Academy of Sciences, Warsaw. Inst. of Physics.

HIGH FIELD HOPPING MAGNETORESISTANCE IN GERMANIUM AND THE EFFECTIVE MASS OF BAND CARRIERS **c76**

Jan Chroboczek *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 486-491 refs (For availability see N75-14531 05-70)

The phonon-assisted hopping conduction is a dominant mechanism of transport in semiconductors when a good localization of the carriers at impurity centers is secured by: (1) low enough temperature; i.e. when kT is significantly smaller than the ionization energy of the impurities; and (2) sufficiently low concentration of impurities; i.e. when the impurity band formation is still impossible. In addition, to make the hop conduction effective, there must be some compensating impurities in the crystal to ionize a part of the majority impurities and this way furnish unoccupied places into which the carriers from the occupied majority impurities may tunnel. The compensating impurities become ionized and, because of their random distribution throughout the crystal, the majority impurity states are randomely shifted up or down from their original positions. Therefore, each hopping transition, contributing to the current, requires the energy emission or absorption, which is possible due to the interaction with phonons. Author

N75-14554 North Texas State Univ., Denton. Dept. of Physics.

EFFECTS OF UNIAXIAL STRAIN ON THE SHUBNIKOV-de HAAS AND MAGNETO-PHOTON EFFECTS IN SEMICONDUCTORS **c76**

D. G. Seiler *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 492-565 refs (For availability see N75-14531 05-70)

The magneto-phonon effect has been successfully used to measure the effective mass variation with uniaxial stress for n-InSb. This experimental variation has then been used to verify the Bir and Pikus strain-dependent conduction band model for InSb. Deformation potentials have been uniquely extracted from the data on both the longitudinal and transverse magneto-phonon oscillations. These deformation potential values are compared to those values obtained in other measurements. The effect of uniaxial stress on the conduction band Fermi surface of n-InSb has been determined by using the Shubnikov-de Haas (SdH) effect. The stress induced frequency anisotropy is shown to be characterized by an ellipsoidal Fermi surface and the inversion-asymmetry splitting of the conduction band is studied with the aid of the stress-induced beating effects. Both numerical and analytical strain-dependent models of the conduction band are used to interpret the observed data. Author

N75-14555 Ecole Normale Superieure, Paris (France). Lab de Physique des Solides.

EXPERIMENTAL STUDIES OF HgTe IN HIGH MAGNETIC FIELDS

Jacques Tuchendler *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 566-603 refs (For availability see N75-14531 05-70)

There has been a considerable interest in the development of narrow-gap semiconductors such as Hg(l-x)Cd(x)Te. This interest was primarily stimulated by the application of these materials to infrared detectors and emitters. Hg(l-x)Cd(x)Te alloys can be obtained in all proportions x by mixing HgTe and CdTe. The energy gap of these mixed crystals can be adjusted by varying x. The general features of the band structure of these alloys are well established. Recent magnetooptical studies of HgTe have yielded considerable and detailed information. The anomalous behavior of the dielectric function has been studied. New experiments provide more data on the warping of the gamma 8 bands, on inversion asymmetry effects and on the energy spectrum of the acceptor states. Further studies on p-type samples will give clues to the intricate structure of the magnetic levels of the gamma 8 valence band. Author

N75-14556 Cologne Univ. (West Germany). Inst. fuer Theoretische Physik.

SOME MANY BODY EFFECTS IN HIGH MAGNETIC FIELDS

Hellmut Keiter *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 604-614 refs (For availability see N75-14531 05-70)

Most many body effects result from either a direct interaction between the carriers (Coulomb interaction), or from an indirect one, for which the best known example is the electron-phonon interaction. It is also known that the innocuous interaction between quasi-free electrons and a single magnetic impurity leads to a many body effect. It accounts for the resistivity minimum (and for other physical properties) of dilute magnetic alloys like CuFe, ZnMn etc., in the absence of magnetic fields. Briefly discussed are: (1) influence of the Kondo-effect on the magneto-resistance of dilute magnetic alloys; and (2) de Haas van Alphen effect in dilute magnetic alloys. Author

N75-14557 Technische Universitaet, Brunswick (West Germany). Inst. fuer Technische Physik.

HIGH MAGNETIC FIELD INVESTIGATIONS IN BISMUTH-ANTIMONY ALLOYS

Detlef Schneider *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 615-628 refs (For availability see N75-14531 05-70)

An introduction is given into the band structure of Bi-Sb alloys, followed by a discussion of the magnetoresistance properties and results of Bi-Sb investigations. Author

N75-14558 Academy of Sciences (USSR), Sverdlovsk. Inst. for Metal Physics.
LONGITUDINAL MAGNETORESISTANCE AND HALL EFFECT OF Cd(X)Hg(1-X)Te IN STRONG MAGNETIC FIELDS
I. M. Tsidilkovski, W. Giriat, G. I. Kharus, and E. A. Neifeld *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 629-657 refs (For availability see N75-14531 05-70)

The results of measurements of the Hall coefficient and longitudinal magnetoresistance of Cd(x)Hg(1-x)Te in the temperature range 1 to 300 K in magnetic fields up to 300 kOe are reported. The analysis of data for zero-gap semiconductors (x =0.1) based on the two-band model shows that hole-like conduction in an impurity band, imposed on the conduction band, takes place. The strong rise of magnetoresistance observed in magnetic field for semiconducting compounds (x =0.175 and x =0.20) is attributed mainly to variation of the scattering probability at low temperatures and to the shift of the band edges in the magnetic fields at higher temperatures. Autor

N75-14559 Wuerzburg Univ. (West Germany).
SUBMILLIMETER-MAGNETO-SPECTROSCOPY OF SEMICONDUCTORS IN INTENSE MAGNETIC FIELDS **c76**
M. V. Ortenberg *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 658-672 refs (For availability see N75-14531 05-70)

Submillimeter magneto-spectroscopy of semiconductors in intense magnetic fields is concerned with any change of the semiconductor-submillimeter-radiation system after interaction in the presence of an external magnetic field. The evaluation of the magnetic field dependent resonance provides detailed information of the energy-wavenumber relation of the semiconductor. Submillimeter magneto-spectroscopy is a powerful method to investigate the energy band structure of semiconductors of any carrier concentration. Special techniques provide additional information of impurity energy levels and the free-carrier g-value. Author

N75-14560 Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
THE MAGNETIC ENERGY LEVEL STRUCTURE OF SEMIMETALS IN THE LIMIT OF LOW QUANTUM NUMBER **c76**
M. S. Dresselhaus *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 673-715 refs Sponsored in part by NSF (For availability see N75-14531 05-70)

To provide a background for the discussion of the magnetic energy level structure of semimetals in the limit low quantum number, the magnetic energy level structure for simple solids is described. Applications of the basic concepts are then made to the semimetals: bismuth, bismuth-antimony alloys and graphite. Particular emphasis is given to developments dealing with the unusual properties of the magnetic energy levels in the limit of low quantum number. Author

N75-14561 Wuerzburg Univ. (West Germany). Physikalisches Inst.
HIGH MAGNETIC FIELD INVESTIGATIONS ON V2-VI3 SEMICONDUCTORS **c76**
H. A. Koehler *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 716-738 refs (For availability see N75-14531 05-70)

The determination of the electronic properties of V2-VI3 compounds from magneto-quantum and magneto-Seebeck investigations yields high densities of states in the valence and conduction bands, whereas the mass parameters are small. This is caused, specially for Bi2Te3, by two-band states and high valley multiplicities. Together with high static dielectric constants, low lattice thermal conductivities and the possibility of the preparation of both n- and p-type Bi2Te3 with comparable electric conductivities favors Bi2Te3 for thermoelectric applications in comparison with all known materials. The probability for the occurrence of all these qualities with still more favorable values for another crystal system is very low. Author

N75-14562 Wuerzburg Univ. (West Germany). Physikalisches Inst.
ANTIFERROMAGNETS IN HIGH MAGNETIC FIELDS
R. Geick *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 739-760 refs (For availability see N75-14531 05-70)

When high magnetic fields are applied to antiferromagnets, various kinds of phase transitions occur at certain critical fields. It is obvious that the new phases (spin flop or paramagnetic) can be investigated only in high magnetic fields. This discussion is mainly concerned with the elementary magnetic excitations (the spin waves, and their dependence on magnetic field and on the type of magnetic ordering). From an experimental study of the spin wave energies, information is obtained about the properties in the different phases and at the phase transitions. Concentraction is primarily on optical experiments. Starting from the well known properties of simple uniaxial antiferromagnets like MnF2 or CoF2 in zero magnetic field, a review is given about the phase transitions in high magnetic fields. For the three phases, the spin waves and their energies are discussed in terms of simple spin wave theory. In these considerations, the Heisenberg type exchange interaction, the anisotropy energy and the Zeeman energy are taken into account. Author

N75-14563 Intermagnetics General Corp., Guilderland, N.Y.
ADVANCES IN HIGH FIELD MAGNET TECHNOLOGY
Carl D. Henning, Paul S. Swartz, and Carl H. Rosner *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 761-795 (For availability see N75-14531 05-70)

The history of the discovery of superconductivity and development of high field superconducting magnets, and their applications, are presented. The discovery of new superconductive materials and their potential utilization in laboratory and commercial applications are described. Future advances in the use of high field superconductors are expected to result from the application of existing materials and more sophisticated design and engineering. A.L.

N75-14564# Technische Universitaet, Hanover (West Germany).
DETERMINATION OF ION YIELD IN WATER FOR SOFT X RADIATION THROUGH ELECTRICAL CONDUCTANCE MEASUREMENTS Ph.D. Thesis [BESTIMMUNG DER IONENAUSBEUTE IM WASSER FUER WEICHE ROENTGENSTRAHLUNG DURCH ELEKTRISCHE LEITFAEHIGKEITSMESSUNG]
Manfred Krueger 1974 59 p refs In GERMAN
Avail: NTIS HC $4.25

Free ion distribution in irradiated water is determined by measuring the radiation induced increase in conductivity in relation to dosages of 450 to 1500 rad/min. The reversible conductance increase is attributed to the ion pair H(+)/O2(-) with a life of almost 1 s; irreversible conductance increases proportional to the overall radiation dosage are attributed to the formation of monoperoxide carbon dioxide from soluble CO2. Continuous irradiation reaches a saturation value when the CO2 content in water reaches an equilibrium minimum through the production of peroxide carbon dioxide. Transl. by G.G.

N75-14565# Los Alamos Scientific Lab., N.Mex.
TSAAS: FINITE ELEMENT THERMAL AND STRESS ANALYSIS OF AXISYMMETRIC SOLIDS WITH ORTHOTROPIC TEMPERATURE-DEPENDENT MATERIAL PROPERTIES
R. V. Browning, D. G. Miller, and C. A. Anderson May 1974 52 p refs
(Contract W-7405-eng-36)
(LA-5599-MS) Avail: NTIS HC $4.25

The finite element method is used to determine the temperatures, displacements, stresses, and strains in axisymmetric solids with orthotropic, temperature dependent material properties under axisymmetric thermal and mechanical loads. The mechanical loads are surface pressures, surface shears, and nodal point forces as well as an axial or centripetal acceleration. The continuous solid is replaced by a system of ring elements with triangular or quadrilateral cross sections. Nonlinear mechanical behavior typified by plastic, locking, 'no tension', or creeping materials is approximated. TSAAS can carry out a transient thermal analysis with the finite element mesh used in stress analysis. Nonlinear thermal

properties and Arrhenius reaction kinetics are also incorporated into TSAAS. Author

N75-14566# California Univ., Berkeley. Lawrence Berkeley Lab.
LOW TEMPERATURE STUDIES. 1. NEW ANTIFERROMAGNETIC RESONANCE EFFECTS IN THE IRON-GROUP FLUORIDES. 2: IMPEDANCE MATCHING A JOSEPHSON-EFFECT GALVANOMETER BY MEANS OF A SUPERCONDUCTING TRANSFORMER
W. E. Tennant May 1974 119 p refs
(Contract W-7405-eng-48)
(LBL-1844) Avail: NTIS HC $5.25

Several new antiferromagnetic resonance effects in the iron group fluorides were revealed by far-infrared spectroscopy. Previously unobserved magnetic adsorptions were seen in MnF2 powders at 7.7 cm(-i) and 8.3cm(-i) just below the antiferromagnetic resonance at 8.7cm(-i). Alloy systems of (Co,Mn)F2, (Fe,Mn)F2, and (Zn,Mn)F2 were studied throughout the concentration range. The magnetic-magnetic systems show two antiferromagnetic resonances, one associated with each magnetic ion. Two additional resonances have been observed in CoF2 doped with 0.%-10% Mn. These resonances are attributed to interactions between neighboring pairs and triplets of Mn ions in the CoF2 host lattice. The (Co,Mn)F2 and (Zn,Mn)F2 AFMR results show good agreement with the coherent potential approximation theory of these systems. A superconducting transformer was developed which increased the Johnson-noise limited range of a superconducting galvanometer by five orders of magnitude in resistance. A theory was developed to evaluate the performance of superconducting galvanometer-transformer combinations. The working model transformer was found to perform according to the theory. Author (NSA)

N75-14567# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
CYLINDRICAL DOMAINS IN FERRO-MAGNETIC FILMS
V. G. Baryakhtar, V. V. Gann, and Yu. I. Gorobets 1974 16 p refs In RUSSIAN
(ITF-74-65P) Avail: AEC Depository Libraries HC $4.00

The phenomonological theory of cylindrical domain structure in thin ferromagnetic films was investigated. Simple analytical relations of domain structure parameters on the external magnetic field were obtained. The behavior of such structures near critical magnetic fields and the stability of cylindrical domain structure were studied. Author

N75-14568# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
DYNAMICS OF MAGNETIC CYLINDRICAL DOMAINS
V. G. Baryakhtar, V. V. Gann, and Yu. I. Gorobets 1974 16 p refs In RUSSIAN
(ITF-74-67P) Avail: AEC Depository Libraries HC $4.00

Cylindrical magnetic domain dynamics and the domain motion's influence on its form and stability were investigated. The oscillations of the cylindrical magnetic domain wall were examined, and their frequencies calculated. It was shown that in the lattice of these domains, three types of waves exist: (1) transverse, (2) longitudinal, and (3) pulsation modes. The velocities of wave propagation were calculated. Author

N75-14569# Siemens-Schuckertwerke A.G., Erlangen (West Germany). Zentralabteilung Technik.
DEVELOPMENT OF SUPERCONDUCTIVE HIGH-FIELD MAGNETS FOR FLUX DENSITIES ABOVE 10 TESLA 1 Apr. 1971-31 Mar. 1973 [ENTWICKLUNG VON SUPRALEITENDEN HOCHFELDMAGNETEN FUER FLUSSDICHTEN UEBER 10 TESLA]
Helmut Kuckuck Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 64 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-29) Avail: NTIS HC $4.25; ZLDI, Munich 13,45 DM

Commercial production of magnet coils for flux densities of 10 to 13 Tesla was attempted; a combination of niobium-tin conductors in the high field section of the magnet with niobium-titanium conductors in the low-field section of the magnet was selected. Difficulties arise in connection with the application of the niobium-tin superconductors consisting of a substrate strip on which the extremely brittle superconducting layer is deposited. This material proved unsuitable for industrial production of large magnets and tests were carried out on conductors made in the laboratory by the vapor phase process. ESRO

N75-14570# Israel Program for Scientific Translations, Ltd., Jerusalem.
PROBLEMS OF WAVE PROPAGATION AND DIFFRACTION, VOLUME 9
1973 142 p refs Transl. into ENGLISH from the monograph "Problemy Difraktsii i Rasprostraneniya Voln." Leningrad, 1969 173 p Sponsored by NOAA and NSF
(TT-72-50042) Avail: NTIS HC $5.75

Papers concerning wave propagation are presented. Topics discussed include: propagation of electromagnetic waves in a spherical impedance waveguide; propagation of VLF waves, and calculation of the shape of the atmosphere; characteristics of propagation of normal waves in the earth-inhomogeneous anisotropic ionosphere waveguide channel; effect of the ionosphere curvature on the ray trajectory in the isotropic case; field of a point source above an impedance piecewise-homogeneous surface; shapes of similar atmospherics; propagation of radio waves above inhomogeneous tracks; and the acoustic field generated in a liquid by the break-up of the ice cover. GRA

N75-14571# King's Coll., London (England).
CRITICAL BEHAVIOR IN MANY BODY SYSTEMS Final Technical Report, May 1973 - Apr. 1974
C. Domb Jul. 1974 161 p refs
(Contract DAJA37-73-C-3493)
(AD-784622) Avail: NTIS CSCL 20/12

This work has been concentrated on a detailed study of low temperature (and high field) expansions for the simple Ising model. Methods were considered for their derivation and derived long series; these have been analyzed to provide evidence on critical indices. Also studied were the derivation of series expansions for the Ising model with spin S = 1/2 and the corresponding low temperature behavior. Also reported is a study of the configurational problem presented by the Potts model and the planar Potts model. The former model in particular has attracted particular attention recently in relation to the properties of liquid crystals. There is evidence that its behavior differs significantly from that of the Ising model and may in certain circumstances lead to a first order transition. Work has continued with a general program of tabulation of lattice constants for all standard two and three dimensional lattices. (Modified author abstract) GRA

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N75-14572*# Stanford Univ., Calif. Electronics Labs.
ACOUSTIC SCATTERING FROM A TURBULENT VORTEX
Vernon W. Ramsey and Allen M. Peterson Jan. 1974 34 p refs
(Grant NGL-05-020-014; Contract N00014-67-A-0112-0044) (NASA-CR-141186; AD-786687; SU-SEL-74-001; SU-TR-3606-9) Avail: NTIS CSCL 20/1

With the aid of the Born approximation, the time autocorrelation and power spectral density are calculated for the received acoustic signal scattered from velocity fluctuations in a turbulent aircraft trailing vortex. The turbulence is required to be globally stationary, but only locally homogeneous. The treatment includes the effects of spectral broadening due to convection of the scattering eddies by a spatially varying mean flow and by macroeddies. The 3 db bandwidth of the received signal is related to the scattering angle and the core Mach number of the vortex. A primary feature of the analysis is that it provides a method for inferring the radial intensity distribution of turbulence in a vortex. The analysis technique is also applicable to scattering from other turbulent flows where significant variations of

turbulence level occur over distances on the order of the macroeddy size. Author (GRA)

N75-14573*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A MODEL FOR JET-NOISE ANALYSIS USING PRESSURE-GRADIENT CORRELATIONS ON AN IMAGINARY CONE
Thomas D. Norum Washington Dec. 1974 29 p refs
(NASA-TN-D-7751; L-9469) Avail: NTIS HC $3.75 CSCL 20A

The technique for determining the near and far acoustic field of a jet through measurements of pressure-gradient correlations on an imaginary conical surface surrounding the jet is discussed. The necessary analytical developments are presented, and their feasibility is checked by using a point source as the sound generator. The distribution of the apparent sources on the cone, equivalent to the point source, is determined in terms of the pressure-gradient correlations. Author

N75-14574# Technische Hochschule, Aachen (West Germany). Lab. fuer Ultraschall.
BASIC INVESTIGATIONS ON THE DEVELOPMENT OF ULTRASONIC RADIATORS WITH HOMOGENEOUS AND PARALLEL ORIENTED SOUND RADIATION FREE OF INTERFERENCE Final Report [GRUNDLEGENDE UNTERSUCHUNGEN ZUR ENTWICKLUNG VON ULTRASCHALLSTRAHLERN MIT INTERFERENZFELDREIER, HOMOGENER UND PARALLEL GERICHTETER SCHALLABSTRAHLUNG ABSCHLUSSBERICHT]
H. H. Fischer, H. J. Jungclaus, and L. Semieniuk 1974 26 p refs In GERMAN
Avail: NTIS HC $3.75

The construction is discussed of special high frequency electron transmitter and receiver units for ultrasonic radiation with sinx/n excitation distribution. It is shown that measurements for continuous and pulsed radiation require different instrumentation. Schlieren photography was used for examining continuous radiation, and a special method, based on an impulse-echo method using a spherical reflector, was developed for pulsed radiation. ESRO

N75-14575# Technisch Physisch Dienst TNO-TH, Delft (Netherlands). Dept. of Acoustics.
RECIPROCITY METHOD FOR THE MEASUREMENT OF ACOUSTICAL SOURCE STRENGTH
T. Tenwolde and J. W. Verheij 9 Sep. 1974 29 p refs
(Rept-420.122; TDCK-65250) Avail: NTIS HC $3.75

A new method for the measurement of acoustical source strength, known as the reciprocity method, is described. Results of this reciprocity method are presented, together with results of other methods. The possibilities of the new method are discussed, with particular reference to underwater sound sources. ESRO

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N75-14576*# Kanner (Leo) Associates, Redwood City, Calif.
STUDY OF THE COLLISIONS OF METASTABLE ATOMS OF He/2 3S/ WITH HELIUM AND NEON, AND OF Ne+ IONS WITH HELIUM
A. P. Kalinin and V. B. Leonas Washington NASA Jan. 1975 16 p refs Transl. into ENGLISH from Acad. of Sci. USSR (Moscow), Report Pr-187, 1974 p 1-29
(Contract NASw-2481)
(NASA-TT-F-16117; Pr-187) Avail: NTIS HC $3.25 CSCL 20H

The differential scattering was studied of beams of $He^*/2\ 3S/$ and Ne^* in He and Ne. The experimental functions for the systems He^*-He and He(+)-He are compared with functions calculated from the potentials. Deviations are found between the calculated and the measured curves. This deviation is eliminated for the system He^*-He by modifying the trend of the adiabatic term. Functions of the potential energies of interaction corresponding to the adiabatic term of the system He^*2 and to that of the system He^*-Ne are found. An analytical approximation of the potentials is proposed. Author

N75-14577*# Oak Ridge National Lab., Tenn. Chemistry Div.
RADIOACTIVE HALOS AND ION MICROPROBE MEASUREMENT OF Pb ISOTOPE RATIOS Final Report
Robert V. Gentry 1974 2 p
(NASA Order T-1213-A)
(NASA-CR-140384) Avail: NTIS HC $3.25 CSCL 20H

This investigation was to obtain, if possible, the Pb isotope ratios of both lunar and meteoritic troilite grains by utilizing ion microprobe techniques. Such direct in situ measurement of Pb isotope ratios would eliminate contamination problems inherent in wet chemistry separation procedures, and conceivably determine whether lunar troilite grains were of meteoritic origin. For comparison purposes two samples of meteoritic troilite were selected (one from Canyon Diablo) for analysis along with two very small lunar troilite grains (approximately 50-100 microns). It was concluded that the ion microprobe as presently operating, does not permit the in situ measurement of Pb isotope ratios in lunar or meteoritic troilite. On the basis of these experiments no conclusions could be drawn as to the origin of the lunar troilite grains. Author

N75-14578# Atomic Energy Commission Research Establishment, Lucas Heights (Australia).
DIRECTED-GRAPH SYNTAX ANALYSER FOR THE ACL-NOVA SYSTEM
P. L. Sanger and I. J. Hayes May 1974 36 p refs
(AAEC/E-312) Avail: AEC Depository Libraries HC $5.00

The syntax of the ACL language is described in terms of a directed-graph structure which is written in a machine independent language and automatically translated to NOVA assembly language. A syntax analyzer based on this directed-graph structure is incorporated into a new version of the ACL-NOVA system to improve the response to terminal input and this, together with a number of other modifications, reduces the size of the system from 61/4K to under 6K words. Author

N75-14579# Academy of Sciences of the Ukrainian SSR, Kiev (USSR). Inst. Teoreticheskoj Fiziki.
DIVISION OF INTERACTIONS AT SHORT AND LONG DISTANCES BETWEEN PARTICLES IN THE METHOD OF DISPLACEMENTS AND COLLECTIVE VARIABLES
M. V. Vavrukh 1974 28 p refs In RUSSIAN
(ITF-74-11P) Avail: AEC Depository Libraries HC $4.50

A degenerate electron gas was investigated by applying a modified method of displacements and collective variables based on short-range dual interaction potentials which change into Coulomb interactions in small interparticle spaces. The perturbation theory was applied where a model system with dual short-range interactions was selected as an unperturbed system. As a result, the short-range interaction considerations are more correct. Asymptotics of a binary function were determined by wave functions of two-particle scattering problem and by the Debye form. Virial expansions for the binary function were obtained on the basis of beta particle correlation functions of the model system. Author

N75-14580# Montpellier Univ. (France). Dept. de Physique Mathematique.
ABOUT THE LEPTONS PAIRS PRODUCTION IN HADRONIC COLLISIONS
F. M. Renard Jul. 1974 8 p refs
Avail: NTIS HC $3.25

By using the generalized vector dominance model a connection is established between the position electron annihilation and the lepton pair production which can explain the important number of leptons observed at large transverse momenta. Author (ESRO)

N75-14581# Picatinny Arsenal, Dover, N.J.
PHOTO AND ELECTRICAL FIELD EFFECTS IN ENERGETIC MATERIALS
D. S. Downs, W. Garrett, D. A. Wiegand, T. Gora, and M. Blais

Sep. 1974 39 p refs
(AD-785543; PA-TR-4711) Avail: NTIS CSCL 07/5

The relationship between the pseudostability of explosives and their electronic structure has been identified and discussed. Specifically, direct, non-thermal, photoelectric initiation of certain energetic materials was shown to occur upon simultaneous application of an electric field and light of an appropriate wavelength. To further characterize the microscopic processes responsible for photoelectronic initiation, it is necessary to study in detail the photodecomposition produced by light with no electric field, and to study the initiation by electric fields in the absence of light with particular emphasis on electrode effects. The authors report here new experimental results which elucidate the mechanism of photoelectronic initiation in lead azide. The spectral and intensity dependence of photodecomposition was monitored by observing the release of nitrogen gas from the azide sub-lattice. Decomposition of the lead sub-lattice was observed by the change in optical density due to formation of colloidal lead. Threshold electric fields have been established for selected metal contacts. A model of the photoelectronic process in lead azide is proposed which takes into account new results from studies of photodecomposition and electric field effects and previous work on photoconductivity and optical absorption. (Modified author abstract) GRA

N75-14582# Air Force Academy, Colo.
LIQUID SCINTILLATION COUNTING OF NEUTRON ACTIVATED FOILS Final Report
Louis F. Wailly, John W. Watters, and Peter B. Carter Jul. 1974 16 p
(AD-784812; USAFA-TR-74-15) Avail: NTIS CSCL 18/4

Aluminum, gold and copper foils were activated by a broad spectrum low intensity neutron beam. The foils were immersed in scintillating fluors and activity determinations were made using a coincident type photomultiplier system. The relative efficiencies for four counting geometries were considered and the most effective geometry was found to be with the foil to be placed in a horizontal position at mid-depth in the fluor. The relative effectiveness of different scientillation fluors varied according to the energy distribution of radiations being measured.
Author (GRA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N75-14583# Technische Universitaet, Hanover (West Germany).
THE EFFECTIVE PARTICLE-PARTICLE AND HOLE-HOLE INTERACTIONS FOR NUCLEI IN THE VICINITY OF LEAD Ph.D. Thesis [DIE EFFEKTIVE TEILCHEN-TEILCHEN- UND LOCH-LOCH- WECHSELWIRKUNG FUER DIE KERNE IN DER BLEIGEGEND]
Rudolf Gaul 1974 86 p refs In GERMAN
Avail: NTIS HC $4.75

Migdal's particle theory is used to analyse the eight nuclear energy spectra that encorporate a Pb-208 nucleus with + or - 2 nucleons. The basic nuclear model is described and the model space with two particle interaction is developed. Effects of the individual parameters on the structure of the exchange reaction are elaborated. The dependence on the interpolation radius is found only significant for the lowest states with small rotation impulses. Spectrum calculations for Pb 206, Pb 210, Hg 206, Po 210, Te 206, and Bi 210 are presented. Transl. by G.G.

N75-14584*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
EXPERIMENTAL OBSERVATION OF LINEAR AND NONLINEAR ION ACOUSTIC PHENOMENA IN A CYLINDRICAL GEOMETRY Ph.D. Thesis
Thomas E. Romesser Dec. 1974 154 p refs
(Grant NGL-16-001-043)
(NASA-CR-141059) Avail: NTIS HC $6.25 CSCL 20H

Ion acoustic phenomena are studied in a cylindrical geometry for two distinct cases. A large amplitude compressive pulse is seen to evolve into solitons. The evolution of these solitons and their dependence on initial conditions show a similarity to previous work on one dimensional solitons. Dimensionless scaling arguments are used to distinguish the two cases. In the presence of a steady state uniform cylindrical beam, approximated by a ring in V sub r, V sub phi, an ion-ion beam instability is observed. This instability exists for a limited range of beam velocities and shows a marked similarity to the strictly one dimensional ion-ion beam instability. Solution of the appropriate dispersion relation shows agreement with the observed phenomenon. Author

N75-14585*# Maryland Univ., College Park. Dept. of Physics and Astronomy.
THE COMPTON-GETTING EFFECT FOR LOW ENERGY PARTICLES
F. M. Ipavich Jun. 1974 16 p refs
(Contract NAS5-11063)
(NASA-CR-139164; TR-74-117) Avail: NTIS HC $3.25 CSCL 20H

It was found that the traditional first-order Compton-Getting effect, which relates particle distributions as observed in two frames of reference moving with constant relative velocity, is inadequate for the description of low energy particles (less than a few hundred keV/nucleon) in the solar system. An exact procedure is given for recovering both isotropic and anisotropic distributions in the solar wind frame from observations made in a spacecraft frame. The method was illustrated by analyzing a particle event observed on IPM-7. Author

N75-14586# Sandia Labs., Albuquerque, N.Mex.
TECHNIQUE FOR DETERMINING THE TENSILE STRENGTH OF INTERFACE BONDS
G. A. Carlson Jun. 1974 14 p refs
(Contract AT(29-1)-789)
(SLA-74-274) Avail: NTIS HC $3.25

A technique is described for determining the tensile strength of interface bonds using the Nereus pulsed electron beam machine as a stress wave generator. The tensile strength of the interface between a steel sample and an electroplated gold coating is found to be 0.8-1.0 GPa (8-10 kbar). NSA

N75-14587# Los Alamos Scientific Lab., N.Mex.
GUIDELINES FOR THE INTERIM STORAGE OF AEC-GENERATED SOLID TRANSONIC WASTES
Jun. 1974 70 p refs
(Contract W-7405-eng-36)
(LA-5645) Avail: NTIS HC $4.25

Guidelines have been developed to provide a basis against which to judge the adequacy of techniques and methods for the retrievable storage of AEC-generated transuranic-contaminated solid wastes. These guidelines apply to operations for packaging, handling, and storage of such wastes. Each guideline has been fully discussed with emphasis on the reasoning behind the guideline statement, problems that should be considered in developing a storage facility, and methods currently in use at AEC installations. Author (NSA)

N75-14588# Oak Ridge National Lab., Tenn.
TRENDS AND PROJECTED SHIPMENTS IN THE NUCLEAR FUEL CYCLE INDUSTRY TO THE YEAR 2000
J. O. Blomeke, J. P. Nichols, and R. Salmon 1974 23 p refs Presented at 4th Intern. Symp. on Packaging and Transp. of Radioactive Mater., Miami Beach, Fla., 22-27 Sep. 1974 Sponsored by AEC
(Conf-740901-5) Avail: NTIS HC $3.25

Projections for the nuclear fuel industry are presented with emphasis on shipments of fuel, plutonium, and various types of wastes. The projections are based on the AEC's forecast of the growth of nuclear power. A brief summary of the detailed results is given. Author (NSA)

N75-14589# Illinois Univ., Urbana.
ADVANCED COUPLING OF NUCLEAR REACTOR-GAS LASER SYSTEMS Technical Progress Report, 31 Aug. 1973 - 31 Aug. 1974
J. T. Verdeyen, G. H. Miley, and W. E. Wells 1974 42 p refs

(Contract AT(11-1)-2007)
(COO-2007-47) Avail: NTIS HC $3.75

The use of nuclear radiation for either direct pumping and/or enhancement of the operation of gas lasers is studied. These techniques have ultimate application in high pressure, hence high power lasers. It is shown that lasers with new lines and characteristics result from nuclear irradiation. If, as is envisioned for many high power lasers, a nuclear power source is to be used, this offers the most efficient way to couple the source and laser. Progress is reported for specific studies under the following section headings: (1) pumping and enhancement of chemical lasers, (2) studies of electron distributions, (3) pumping and enhancement of noble gas lasers, and (4) spectroscopic studies of irradiated gases. Author (NSA)

N75-14590# Oak Ridge Y-12 Plant, Tenn.
DESIGN ASPECTS OF A MULTIWALL 1750 C FURNACE FOR 20,000 PSI ARGON OPERATION
C. H. Curtis and H. A. Pohto 24 Jun. 1974 19 p refs Presented at Pressure Vessels and Piping-Mater.-Nucl. Conf., Miami Beach, Fla., 24-28 Jun. 1974 Revised
(Contract W-7405-eng-26)
(Y-EC-195-Rev-1; Conf-740606-17) Avail: NTIS HC $3.25

A high temperature, high pressure furnace was designed and constructed for an existing 9-inch I.D. x 30-inch deep vertical standing pressure vessel to obtain a 3-inch diameter x 6-inch long hot zone for 1750 C and 20,000 psi operation with argon. The furnace design is of the multiwall bell-type concept eliminating convection flow heat losses and reducing almost completely erosion due to thermal currents. Author

N75-14591# Atomic Energy Commission, Oak Ridge, Tenn. Technical Information Center.
REPORT ON THERMIONIC ACTIVITIES IN FRANCE
20 May 1974 5 p Transl. into ENGLISH from Rapport sur 'es Activites Thermoelectroniques en France; French rept.
(AEC-tr-7565) Avail: NTIS HC $3.25

Development programs in France for thermionic reactors are reviewed. NSA

N75-14592# Du Pont de Nemours (E. I.) and Co., Aiken, S.C. Savannah River Lab.
Pu-238 FUEL FORM PROCESSES Monthly Report
Jun. 1974 21 p refs
(Contract AT(07-2)-1)
(DPST-74-128-6) Avail: NTIS HC $3.25

LASL has completed the definition of the PPO flowsheet. Shards may be stored up to four months without damage to microstructure by decay helium on subsequent hot pressing. Times for post-hot-pressing heat treatment were shortened. Thermal conductivity of ball-milled Pu-238 O2 has been measured between 200 and 1100 C in air, argon, and helium. Scheduled completion of the Plutonium Experimental Facility may be delayed because of difficulty in obtaining stainless steel sheets. Author (NSA)

N75-14593# Westinghouse Electric Corp., Madison, Pa. Advanced Reactors Div.
CLINCH RIVER BREEDER REACTOR: A COMBINED POWER AND FUEL SOURCE
W. M. Jacobi and Y. S. Tang 1974 19 p refs Presented at the 77th Natl. Meeting on the Am. Inst. of Chem. Engr., Pittsburgh Sponsored by AEC
(Conf-740609-4) Avail: NTIS HC $3.25

The features of LMFBR type reactors, the design status of the Clinch River Breeder Reactor, and the projected future improvements for commercial fast breeders are presented. Author (NSA)

N75-14594# Siemens A.G., Munich (West Germany).
NUCLEAR RESONANCE SPECTROSCOPY OF MAGNETIC MATERIALS AT ZERO FIELD [NULLFELDKERN RESONANZ-SPEKTROSKOPIE MAGNETISCHER WERKSTOFFE]
Eckart Hundt, Christian Kuznia, and Heinz-Diether Leistner Bonn Bundesmin. fuer Forsch. und Technol. Jun. 1974 40 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-15) Avail: NTIS HC $3.75; ZLDI, Munich 8.40 DM

Nuclei of ferromagnetic materials show a spin resonance even without an external magnetic field. The resonance frequency is characteristic for each material. For the measurement of ferromagnetic nuclear resonance an automatic data processing facility was constructed. New methods of measurement, evaluation, and interpretation for a continuous wave spectrometer was well as for a pulse spectrometer were developed. For pulse measurements the excitation condition of the pulses as well as the frequency dependence of the receiver were taken into account, thus, higher frequency resolution and more efficient measurements which allow a more accurate analysis of magnetic materials in a shorter time were achieved. Author (ESRO)

N75-14595# Science Applications, Inc., La Jolla, Calif.
MODELS OF PHOTON RADIATION IN AIR Final Report, 10 Apr. 1970 - 31 Mar. 1974
William A. Woolson, Louis Huszar, and Robert J. Harris, Jr. Sep. 1974 63 p refs
(Contract DASA01-70-C-0090; DNA Proj. NWED-QAXP)
(AD-784956; SAI-73-629-LJ; DNA-3279T) Avail: NTIS CSCL 18/8

A data base of photon transport in air for energies extending from 10 keV to 10 MeV was generated for parametric modeling for the ATR code. The data base was generated in two separate units; one for gamma-ray problems which has 18 energy groups from .02 MeV to 10 MeV, and the other, for x-ray problems which has 18 energy groups from 10 keV to 300 keV. The gamma-ray energy group structure is identical to the group structure for the secondary photons of the neutron ATR data base; thus allowing one to use ATR to obtain results for a complete neutron and gamma-ray radiation source problem. The x-ray data base was geared toward the special problems of obtaining accurate transport calculations for sources in the x-ray energy region. GRA

N75-14596# Army Electronics Command, Fort Monmouth, N.J.
OPTIMIZATION OF SINGLE PARTICLE ABSORPTION CROSS SECTION
Kenneth Bardall Aug. 1974 16 p
(DA Proj. 1S7-62705-AH-94A)
(AD-785712; ECOM-4248) Avail: NTIS CSCL 20/12

The single particle absorption cross section is maximized with respect to the imaginary component of permittivity, separately, by means of elementary calculus. This optimization yields relationships between the aspect ratio and the real and imaginary parts of permeability and permittivity for the single particles. The significance of this optimization is discussed for the magnetic spherical and cylindrical particle cases and for the dielectric spherical and cylindrical particle cases. The effect of this maximization on the single particle scattering cross section and the minimization of the latter cross section are presented. (Modified author abstract) GRA

N75-14516 European Organization for Nuclear Research, Geneva (Switzerland).
RESONANCES IN HIGH ENERGY COLLIDING LEPTON BEAMS
John L. Rosner *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 29-40 refs (For availability see N75-14514 05-70)

N75-14517 Paris Univ., Orsay (France).
ELECTRON-POSITRON INTERACTIONS AT E SUB CM EQUALS 4 GeV AT THE CAMBRIDGE ELECTRON ACCELERATOR
Ronald Madaras *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 41-72 refs (For availability see N75-14514 05-70)

N75-14518 Laboratoire de Physique Theorique et Particules Elementaires, Orsay (France).
INELASTIC ELECTRON-POSITRON SCATTERING
Michel Gourdin *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 73-78 refs (For availability see N75-14514 05-70)

N75-14519 Universite des Sciences et Techniques de Lille (France). Dept. de Physique Mathematique.
STRUCTURES IN POSITRON ELECTRON ANNIHILATION: HIGHER VECTOR MESONS OR INELASTIC EFFECTS
Fernand-Michel Renard *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 79-100 refs (For availability see N75-14514 05-70)

N75-14520 Rome Univ. (Italy).
THEORETICAL IDEAS ABOUT ONE PARTICLE INCLUSIVE REACTIONS INDUCED BY LEPTONS
Guido Altarelli *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 101-123 refs (For availability see N75-14514 05-70)

N75-14522 Deutsches Elektronen-Synchrotron, Hamburg (West Germany).
EXPERIMENTAL RESULTS ON HYDRON PRODUCTION IN INELASTIC ELECTRON SCATTERING
Henrich Meyer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 135-180 refs (For availability see N75-14514 05-70)

N75-14523 Deutsches Elektronen-Synchrotron, Hamburg (West Germany).
GENERALIZED VECTOR DOMINANCE
Dieter Schildknecht *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 181-234 refs (For availability see N75-14514 05-70)

N75-14524 Budapest Science Univ. (Hungary). Dept. of Physics.
LIGHT CONE PHYSICS AND THE PARTON MODEL: GENERAL ASPECTS AND APPLICATIONS
Julius Kuti *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 235-268 refs (For availability see N75-14514 05-70)

N75-14525 Ecole Polytechnique, Paris (France).
PRELIMINARY RESULTS ON ANTINEUTRINO AND NEUTRINO TOTAL CROSS-SECTIONS
Maurice Haguenauer *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 269-280 refs (For availability see N75-14514 05-70)

N75-14529 Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette (France).
HIGHER ORDER CALCULATIONS IN GAUGE THEORIES
Benni Lautrup *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 345-377 refs (For availability see N75-14514 05-70)

N75-14530 Laboratoire de Physique Theorique et des Hautes Energies, Paris (France).
ON SEARCHING FOR CHARM PARTICLES
George A. Snow *In* CNRS Electromagnetic and Weak Interactions, Vol. 1 1973 p 379-390 refs (For availability see N75-14514 05-70)

N75-14544 Max-Planck-Institut fuer Festkoerperforschung, Stuttgart (West Germany).
DEGENERATE EXCITONS IN ZINCBLENDE TYPE CRYSTALS IN A MAGNETIC FIELD
K. Cho *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 315-338 refs (For availability see N75-14531 05-70)

N75-14547 Vrije Universiteit, Amsterdam (Netherlands). Natuurkundig Lab.
CYCLOTRON-RESONANCE LINE WIDTH AS A TRANSPORT PROPERTY
A. Lodder *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 382-385 refs (For availability see N75-14531 05-70)

74 OPTICS

Includes light phenomena.

N75-14597*# Radio Corp. of America, Princeton, N.J. Astro-Electronics Div.
PROTOTYPE COLOR FIELD SEQUENTIAL TELEVISION LENS ASSEMBLY Final Report, Nov. 1973 - Oct. 1974
Oct. 1974 139 p
(Contract NAS9-13688)
(NASA-CR-141449) Avail: NTIS HC $5.75 CSCL 20F

The design, development, and evaluation of a prototype modular lens assembly with a self-contained field sequential color wheel is presented. The design of a color wheel of maximum efficiency, the selection of spectral filters, and the design of a quiet, efficient wheel drive system are included. Design tradeoffs considered for each aspect of the modular assembly are discussed. Emphasis is placed on achieving a design which can be attached directly to an unmodified camera, thus permitting use of the assembly in evaluating various candidate camera and sensor designs. A technique is described which permits maintaining high optical efficiency with an unmodified camera. A motor synchronization system is developed which requires only the vertical synchronization signal as a reference frequency input. Equations and tradeoff curves are developed to permit optimizing the filter wheel aperture shapes for a variety of different design conditions. Author

N75-14598*# Linguistic Systems, Inc., Cambridge, Mass.
CHARACTERISTICS OF LIGHT INTENSITY FLUCTUATIONS IN A DIFFRACTION ORDER AS A FUNCTION OF THE ANGLE OF INCIDENCE OF THE LIGHT BEAM ON THE SURFACE OF AN ULTRA-SONIC LIGHT MODULATOR
V. V. Kludzin Washington NASA Oct. 1974 9 p refs Transl. into ENGLISH from Radiofizika (USSR), v. 17, no. 2, 1974 p 261-264
(Contract NASw-2482)
(NASA-TT-F-15838) Avail: NTIS HC $3.25 CSCL 20F

The experimental characteristics of the light intensity distribution in a Bragg diffraction order were studied. They are presented as a function of the angle of incidence of the light beam on the surface of a delay line in the presence of nonresonance of ultrasonic wave excitation for lithium niobate monocrystals in the frequency range of 300 to 700 Mc/S. Author

N75-14599# Zeiss (Carl), Oberkochen (West Germany).
SYNTHETIC CRYSTALS FOR OPTICS [SYNTHETISCHE KRISTALLE FUER DIE OPTIK]
Hartmut Hesse Bonn Bundesmin. fuer Forsch. und Technol. Jul. 1974 37 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-T-74-20) Avail: NTIS HC $3.75; ZLDI Munich 7,80 DM

Several methods were applied to grow crystals with high birefringence and light refraction and to analyze their optical properties. Crystals of sodium nitrate and lithium iodate were grown from aqueous solutions; crystals of sodium nitrate, lead molybdate, lead tungstate, magnesium titanate, strontium titanate, bismuth germanate, and bismuth silicate were grown from the melt. Author (ESRO)

N75-14600# Forschungsgruppe fuer Informationsverarbeitung und Mustererkennung, Karlsruhe (West Germany).
PROGRAMMING LANGUAGE FOR AUTOMATIC IMAGE PROCESSING [UEBERLEGUNGEN ZU EINER PROGRAMMIERSPRACHE FUER DIE AUTOMATISCHE BILDVERARBEITUNG]
B. Fink Bonn Bundesmin. fuer Verteidigung 1974 98 p In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Verteidigung
(BMVG-FBWT-74-7) Avail: NTIS HC $4.75; Bundeswehramt 30 DM

A higher programming language for automatic image processing, both for automatic local image processing and for global picture description, is discussed. Automatic image processing includes data collection and coding (scanning linear

or planar samples), processing and interpretation, formal image description, and recognition. Theoretical investigations are dealt with and the syntax and grammar of the programming language are described. ESRO

N75-14601# Technisch Physisch Dienst TNO-TH, Delft (Netherlands). Afdeling Optiek.
MEASUREMENT OF OPTICAL SYSTEM TRANSMISSION FOR DAYTIME OBSERVATION [METING VAN DE TRANSMISSIE VAN OPTISCHE SYSTEMEN VOOR DAGWAARNEMING]
H. J. Raterink and E. Sies 9 Jul. 1974 31 p In DUTCH
(Contract A73/KL/045)
(TPD-1974-0-2; TDCK-64990) Avail: NTIS HC $3.75

A set up for transmission measurements of daytime optics was developed. Previously used methods led to a diversity of results. The set up consists of an optometer with several filters and an amplifier with an analog readout. The photodetector is a silicon cell providing a spectral sensitivity equal to the human eye. A parallel homogeneous light beam is produced by a tungsten band lamp. The equipment was used to measure the transmission of three compass aiming devices. ESRO

N75-14602# Physics Lab. RVO-TNO, The Hague (Netherlands).
OPTICAL CORRELATION
J. A. Boden Mar. 1974 59 p refs
(PhL-1974-07; TDCK-64282) Avail: NTIS HC $4.25

Coherent optical correlators, classified as spatial plane correlators, frequency plane correlators, and special reference correlators, are examined. Basic principles, advantages, and disadvantages are discussed, and comparisons made with incoherent correlators. Advantages of optical analog techniques over electronic systems, because of their large information capacity and two-dimensional capability, are reviewed. The applications as real-time input device of ultrasonic light modulators is discussed. ESRO

N75-14603# Max-Planck-Institut fuer Extraterrestrische Physik, Munich (West Germany).
PERFORMANCE CHARACTERISTICS OF TWO ENGLISH ELECTRIC VALVE ULTRAVIOLET TO VISIBLE IMAGE CONVERTERS WITH DEFLECTION CAPABILITY Test Report, 1 Mar. - 1 Aug. 1974
K.-H. Stephan 1 Aug. 1974 92 p refs
(Contract ESTEC-2056/73-AK)
(ESRO-CR(P)-537) Avail: NTIS HC $4.75

Tube performances, as given in the manufacturer's study report, were verified for application to astronomic photometry and spectroscopy from satellites and sounding rockets. The tests were executed at a vacuum UV test facility developed for absolute intensity calibrations of rocket and satellite payloads. Measurements were performed in the wavelength region 1100 to 7000 A. With the exception of resolving power, the measured properties are in good agreement with specifications claimed by the manufacturer. No explanation can be given for discrepancies. A satisfactory reproducibility of reported features can be confirmed. The tubes are considered to prove useful also for ground based laboratory studies such as UV spectroscopy. An application of the field of absolute radiometry, e.g. as transfer standards, seems to be of interest. ESRO

N75-14604# Air Force Academy, Colo.
A DIGITAL LEAD COMPUTING OPTICAL SIGHT MODEL Final Report
Anthony L. Leatham, John C. Durrett, and Salvatore Alfano Sep. 1974 54 p refs
(AD-786464; USAFA-TR-74-17) Avail: NTIS CSCL 19/5

The equations for the lead computing optical sight are developed for implementation in an on-board digital computer. Numerical comparisons are made with a digital model of several lead computing optical sights currently employed on an advanced fighter aircraft. The effects of aircraft roll rate on the lead angle are correctly modeled, which results in significant improvement of the lead angle prediction during maneuvers involving roll. The equations developed are also useful in the implementation of a director type gunsight where the angular rate of the line of sight is measured directly by a tracking device. (Modified author abstract) GRA

N75-14605# Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE LIMITS OF DETECTABILITY OF A LOW-LIGHT-LEVEL POINT-SOURCE SENSOR AS A FUNCTION OF TELESCOPE APERTURE, SENSOR RESOLUTION, NIGHT-SKY BACKGROUND, AND PRE-READOUT ELECTRON GAIN
Robert Weber and Thomas H. Brooks 16 Aug. 1974 127 p refs
(Contract F19628-73-C-0002; AF Proj. 649L)
(AD-785137; TN-1974-21; ESD-TR-74-243) Avail: NTIS CSCL 20/6

Based on laboratory measurements and on field experience in detecting G-type stars and point-objects by reflected sunlight, a figure of performance of a low-light-level sensor operating continuously at standard TV rates and incorporating a variable pre-readout current gain of 20,000 has been developed and extrapolated to specify limiting detectable point-source visual magnitudes for telescope apertures ranging from 7 in. to 400 in., and for image-cell angular diameters from 0.5 to 60.0 sec. The detection criterion, expressed in video SNR, is that the point-source images in typical real-sky situations be detectable on the screen of a video monitor (with essentially 100% probability of detection) by a human observer. After three limiting cases are discussed, camera-tube saturation is considered. Levels are determined for the present sensor and for sensors of the future. (Modified author abstract) GRA

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N75-14606 Polish Academy of Sciences, Warsaw.
DETERMINATION OF REFLECTION COEFFICIENTS OF LECHERS LINE FOR PURPOSES OF DIAGNOSING GYROTROPIC PLASMA [WYZNACZANIE WSPOLCZYNNIKA ODBICIA LINII LECHERA DLA CELOW DIAGNOSTYKI PLAZMY ZYROTROPOWEJ]
Barbara Atamaniuk 1974 21 p refs In POLISH
(Rept-11/1974) Avail: Issuing Activity

A dual-channel transmission line fed by a microwave signal flowing through a plasma column, and the measurement of the line's electrical parameters are discussed. It was found that in the case of the gyrotropic plasma (in a gyrotropic axis lying on a surface, perpendicular to Lecher's line), the analytic solution to the problem of electromagnetic wave propagation along the line is not known. The difficulties of solving this problem are discussed. Other topics discussed include: anisotropic media, dielectric permeation, and reflection coefficients for dual-channel transmission lines. Transl. by M.J.S.

N75-14607# Brussels Univ. (Belgium).
STATISTICAL MECHANICS OF NONUNIFORM SYSTEMS SUBJECTED TO AN ARBITRARY AND TIME DEPENDENT EXTERNAL FIELD. DYNAMICS OF NONKINETIC STATES AND THE SUPERKINETIC EQUATION. APPLICATION TO STRONG PLASMA TURBULENCE
R. Balescu and J. H. Misguich May 1973 218 p refs In FRENCH
(EUR-CEA-FC-691) Avail: AEC Depository Libraries HC $14.00

The separation of the distribution function of a system of N interacting particles into its two orthogonal projections in two invariant sub-spaces leads to the confirmation that the kinetic equation arises exactly from the kinetic components. The two orthogonal projections obey two completely decoupled equations as a result of the existence of two totally independent systems of sub-dynamics. Under normal experimental conditions, the nonkinetic component is zero for all observation times. The superkinetic equation, P(t)f(t), proves to be particularly adequate for studying strong turbulence in plasmas: the external field is thus treated as a stochastic field having an average part and a fluctuating part. The changes occurring in the plasma in the presence of the fluctuating external field describe the turbulent behavior of the system. The asymptotic limit of the average equations is studied using the stochastic correlation subdynam-

ics. The quasi-linear stochastic approximation is established as a special case. NSA

N75-14608# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRON EXCITATION OF HIGH PRESSURE Ar, Kr, AND Xe
P. J. Ebert, H. A. Koehler, L. J. Ferderber, and D. L. Redhead 21 May 1974 6 p refs Presented at the 4th Intern. Conf. on Atomic Phys., Heidelberg Sponsored by AEC
(UCRL-75708; Conf-740711-3) Avail: NTIS HC $3.25

High pressure Ar, Kr, and Xe were excited with high current bursts of relativistic electrons at 100 keV. The spectral and temporal characteristics of the vacuum ultraviolet continua centering near 126 nm in Ar, 150 nm in Kr, and 170 nm in Xe were studied. The pressure dependence of the buildup and decay time constants are shown. NSA

N75-14609# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
SOME ASPECTS OF PLASMA DIAGNOSTICS BY MEANS OF A DIAMAGNETIC COIL
H. M. Mayer May 1974 20 p refs
(IPP-4-74) Avail: AEC Depository Libraries HC $4.00

The response of a coil to diamagnetic pulses of exponential shape was calculated. The circuit considered consists of a coil which is terminated in a capacitive and resistive load and at the same time inductively coupled to a shield. Different geometries for compensation are discussed as well as the conditions which lead to integration of the original pulse. Author (NSA)

N75-14610# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
CURRENT FILAMENTATION IN PARALLEL FIELD TURBULENT PLASMAS
D. Biskamp and W. Horton Mar. 1974 24 p refs
(IPP-6/124) Avail: AEC Depository Libraries HC $4.25

The conditions for the occurrence of instabilities producing current filaments and current sheets in the high frequency domain of a parallel current driven turbulent plasma were studied. The effect of such a current filament at high densities is shown to produce a perpendicular acceleration of the electrons which, under conditions where sufficient development of the filament occurs, creates cross-field ion acoustic turbulence. The presence of cross-field ion-acoustic turbulence, which in electrostatic simulation is observed to produce substantial heating, would substantially reduce the existing discrepancies between the parallel turbulent experiments and the corresponding electrostatic simulation. Author (NSA)

N75-14611# Max-Planck-Institut fuer Plasmaphysik, Garching (West Germany).
ENERGY DISTRIBUTION OF ELECTRONS IN A PROTON-ELECTRON PLASMA WITH DENSITIES HIGHER THAN THE SOLID-STATE DENSITY
H. Wulff May 1974 20 p refs In GERMAN
(IPP-3-12) Avail: AEC Depository Libraries HC $4.00

This paper proves that Fermi electrons have to be bound, which has hitherto gone unnoticed. The distinction between bound and free electrons valid for low-density plasmas is extended to high densities and a new energy distribution function for the electrons is given. It is found that for plasmas in which a Bohr sphere defined by a-3 sub B (a sub B = Bohr radius) contains more than one electron the Pauli principle is incompatible with the virial theorem. Author (NSA)

N75-14612# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France).
KINETIC EQUATIONS FOR PLASMAS SUBMITTED TO A STRONG TIME-DEPENDENT EXTERNAL FIELD. 4: RENORMALIZED STOCHASTIC TREATMENT AND KRAICHNAN MODEL EQUATION FOR TURBULENCE
R. Balescu and J. H. Misguich Dec. 1973 15 p refs
(EUR-CEA-FC-718) Avail: AEC Depository Libraries HC $4.00

The stochastic treatment developed in the preceding paper for the general kinetic equation is renormalized here in such a way that the lowest order approximation yields to the analog of the Kraichnan model equation for fluid turbulence. NSA

N75-14613# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
[ACTIVITIES OF THE INSTITUTE FOR PLASMA RESEARCH] Annual Report, 1973 [FORSCHUNGSBERICHT 1973]
1973 116 p refs In GERMAN
Avail: NTIS HC $5.25

The 1973 annual research report is presented. Activities cover results of research in the following fields: plasma heating and waves, plasma focus and shock wave investigations, short-time phenomena, and laser applications in plasma diagnostics. ESRO

N75-14614# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
EXPERIMENTAL AND THEORETICAL INVESTIGATIONS OF MAGNETOHYDRODYNAMIC FLOW PROCESSES WITH TRANSVERSAL MAGNETIC FIELD IN THE SHOCK TUBE [EXPERIMENTELLE UND THEORETISCHE UNTERSUCHUNGEN MAGNETOHYDRODYNAMISCHER STROEMUNGSVERSUCHE MIT TRANSVERSALEM MAGNETFELD IM STOSSWELLENROHR]
E. Holzhauer 1973 97 p refs In GERMAN
(IPF-73-5) Avail: NTIS HC $4.75

Experimental and numerical investigations were carried out on the interaction of a plasma flow and a transversal magnetic field of finite expansion in the flow direction (and effect). The unsteady plasma flow was obtained in a gas dynamic shock tube at shock Mach numbers between 9 and 13 and initial pressures between 1 and 10 torr in an argon-xenon mixture with short ionization relaxation time. At temperatures up to 10,000 K test times were obtained between 40 and 200 microseconds. The following plasma parameters were measured: gas pressure, magnetic field, induced EMF, electron density variation, and gas density. Results show induction of eddy currents in the plasma, changing the hypersonic flow into a subsonic flow. Modification of dilution and compression waves was confirmed by measurement of the induced magnetic field. The interaction is strongly determined by ionization effects. ESRO

N75-14615# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
EXPERIMENTAL INVESTIGATION OF ALFVEN WAVES IN AN ARC PLASMA [BEITRAEGE ZUR EXPERIMENTELLEN UNTERSUCHUNG VON ALFENWELLEN IN EINEM BOGENPLASMA]
G. Mueller 1973 97 p refs In GERMAN
(IPF-73-6) Avail: NTIS HC $4.75

The propagation and field structure of Alfven waves along a cylindrical plasma column of an axially magnetized arc discharge were experimentally investigated and theoretically analyzed. An axial propagation of torsional Alfven waves was strongly affected by the radial boundaries of the plasma and by the occurrence of neutral gas. The neutral gas leads to a virtual increase of the ion mass and therefore to a deeper effective ion cyclotron frequency, an amplification of the Hall effect. The experiments were carried out in an arc discharge plasma with currents up to 3 kA, in hydrogen and helium, at pressures in the torr range. ESRO

N75-14616# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
EXPERIMENTAL INVESTIGATION OF THE OPERATIONAL CHARACTERISTICS OF A PLASMA FOCUS [EXPERIMENTELLE UNTERSUCHUNG DER BETRIEBSCHARAKTERISTIK EINES PLASMAFOKUS]
H. Rapp Jan. 1974 121 p refs In GERMAN
(IPF-74-1) Avail: NTIS HC $5.25

The construction and testing of a 60 kj plasma focus installation of the Mather type for generating a deuterium plasma with fusion condition is described. The neutron yield, the neutron flux anisotropy, and the neutron spectrum were measured. It is shown that neutron yield, gas pressure, and stored energy are typically related and can be described by a characteristic curve. Results based on numerical and analytical snow plough calculations show that the optimal work point on the curve corresponds to an axial and radial plasma velocity remaining constant during acceleration or compression. ESRO

N75-14617# Owens-Illinois, Inc., Toledo, Ohio.
RUGGEDIZED PLASMA PANEL Final Report, Jun. 1973 - Mar. 1974
L. J. Roth and R. A. Moser Aug. 1974 55 p
(Contract F30602-73-C-0315)
(AD-786045; RADC-TR-74-202) Avail: NTIS CSCL 09/5

The report is part of an overall effort to develop a reliable, fully qualified, flat panel, gas discharge display console to survive and operate in a hostile environment such as encountered in field or airborne command and control systems. The specific objective of this portion of the overall effort is to redesign the panel driving electronic system of the Owens-Illinois, Incorporated commercial DIGIVUE model 512-60 Display Memory Unit. This report contains the engineering grade documentation and analysis accomplishing this task. The specific objectives of the electronic ruggedization have been accomplished. Analysis and breadboard tests indicate that the display unit will operate with good margins over the temperature range of -20 to +55C continuously and with intermittent operation of up to 30 minutes at 71C. Author (GRA)

N75-14618# Illinois Univ., Urbana. Coordinated Science Lab.
ANALYSIS OF WAVE-PARTICLE INTERACTIONS IN A BEAM PLASMA SYSTEM
Dan Winske Jul. 1974 197 p refs
(Contract DAAB07-72-C-0259)
(AD-786534; R-652; UILU-ENG-74-2218) Avail: NTIS CSCL 20/9

Several mechanisms to explain the saturation of the beam plasma instability and the simultaneous broadening of the beam energy distribution function for the case where the beam is cold and weak and the plasma is cold and collision dominated are explored. (Modified author abstract) GRA

N75-14619# Naval Research Lab., Washington, D.C.
THE EFFECT OF PLASMA INHOMOGENEITY ON THE PRODUCTION OF ENERGETIC ELECTRONS Interim Report
H. H. Klein and Wallace M. Manheimer Aug. 1974 13 p refs
(NRL Proj. 77H02-29)
(AD-786354; NRL-MR-2870) Avail: NTIS CSCL 20/9

Intense radiation impinging on a plasma near the critical density may be absorbed by exciting electrostatic plasma waves. In inhomogeneous plasmas these oscillations convect out of the interaction region to lower densities where the waves have lower phase velocities. Electrons whose velocity are not much greater than the thermal velocity then absorb the wave. In this process, very few highly energetic electrons are produced. The authors present theory and simulation for the absorption of these waves in an inhomogeneous plasma. Author (GRA)

N75-14546 Osaka Univ. (Japan). Dept. of Physics.
DIELECTRIC CONSTANT, CARRIER DENSITY AND BAND PARAMETERS BY MAGNETOPLASMA WAVES
Hajimu Kawamura *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 370-381 refs (For availability see N75-14531 05-70)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N75-14620*# Hayes International Corp., Huntsville, Ala.
A THEORETICAL STUDY OF OPTICAL CONTACT OF VITREOUS SILICA
T. D. Barber 21 Apr. 1972 53 p refs
(Contract NAS8-21809)
(NASA-CR-61385; ED-517) Avail: NTIS HC $4.25 CSCL 20L

Optical contact has been proposed as a method of bonding quartz parts of the Stanford relativity satellite. The theory of the van der Waals force is outlined and applied to the problem of optical contact. The effect of various contaminations is discussed and a program of experimentation for further study of the problem is presented. Author

N75-14621# Technische Universitaet, Hanover (West Germany).
THE PRESSURE DEPENDENCE OF MELTING AND CLARIFYING TEMPERATURES OF LIQUID CRYSTALS IN RELATION TO MOLECULAR STRUCTURE Ph.D. Thesis [DIE DRUCKABHAENGIGKEIT DER SCHMELZ- UND KLAERTEMPERATUR FLUESSIGER KRISTALLE IN ABHAENGIGKEIT VON DER MOLEKUELSTRUKTUR]
Mehdi Feyz 1974 99 p refs In GERMAN
Avail: NTIS HC $4.75

Optical methods were used to obtain melt- and settling-pressure curves for liquid crystals in relation to their molecular structures at pressures up to 5 kbar and at temperatures up to 200 C. Five homologous groups of nematic liquid crystals as well as some smectic and cholesteric compounds were analyzed. Transl. by G.G.

N75-14622# Argonne National Lab., Ill.
THE rf LOSSES IN SUPERCONDUCTING HELIX RESONATORS (APPROX. EQUALS 100 MHz RANGE) CAUSED BY FROZEN-IN MAGNETIC FIELD
B. Piosczyk Jul. 1974 28 p refs Transl. into ENGLISH from the German report Rept-73-3-LIN Sponsored by AEC
(ANL-Trans-956; Rept-73-3-LIN) Avail: NTIS HC $3.75

The added surface resistivity RH caused by frozen-in magnetic flux in the 100-MHz regions show a complex behavior compared to that in the GHz-range. It is observed to have a stronger temperature-dependence and an increase of RH with increasing RF-field intensity. The field intensity-dependent term of RH may be caused by motion of the frozen-in flux tubes in the RF field. The increase of RH with increasing RF-field intensity requires that when high RF-field intensities are used, better magnetic shielding be employed than is necessary for measurements with low RF-intensities. Author (NSA)

N75-14623# Commissariat a l'Energie Atomique, Grenoble (France).
NUMERICAL SIMULATION OF THE DIFFUSION OF IMPURITIES IN A SEMICONDUCTOR. APPLICATION TO THE CASE OF BORON IN SILICON Ph.D. Thesis - Univ. Sci. et Med.
J. Monnier Jun. 1974 99 p refs In FRENCH
(CEA-R-4490) Avail: AEC Depository Libraries HC $8.00

The use of a technological bonding model to numerically simulate impurity diffusion in semiconductors was discussed. Both theoretical and experimental studies were made using boron diffusion in silicon as an example. An analysis was also made of impurity transport at high temperature. Several mathematical formulations are included. Transl. by E.H.W.

N75-14624# Technische Universitaet, Munich (West Germany). Inst. fuer Raumfahrttechnik.
A NEW ACCELERATOR FOR MICROMETEOROID SIMULATION [EIN NEUER BESCHLEUNIGER FUER DIE SIMULATION VON MIKROMETEORIDEN]
Eduard B. Igenbergs Bonn Bundesmin. fuer Forsch. und Technol. May 1974 141 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. und Technol.
(BMFT-FB-W-74-03) Avail: NTIS HC $5.75; ZLDI, Munich 29,65 DM

Abundance and velocity distribution of micrometeoroids are discussed, and existing acceleration techniques for micrometeoroid simulation are reviewed. A coaxial plasma accelerator producing a fast high density plasma flow with the aid of a compressor coil was developed, and tests on acceleration of glass particles with diameters between .125 and .7 mm to over 20 km/sec, leading to further improvements of the accelerator, are detailed. ESRO

N75-14625# Centre National de la Recherche Scientifique, Toulouse (France). Lab. d'Automatique et d'Analyse des Systemes.
BIPOLAR SEMI-CONDUCTOR DEVICE BEHAVIOR UNDER IRRADIATION Annual Report [CARACTERISATION DU COMPORTEMENT DES DISPOSITIFS SEMICONDUCTEURS BIPOLAIRES SOUS IRRADIATION RAPPORT ANNUEL]

J. Buxo and D. Esteve 8 Mar. 1974 115 p refs In FRENCH
(Contract CEA-DAM-3-897-0-762-0601)
(LAAS-Publ-1100) Avail: NTIS HC $5.25

The main components of the base current in a bipolar transistor were studied using a computer program of numerical identification in regard to the thermal, radiative, and surface potential constraints. The respective extent of the surface and volume components was determined together with the intrinsic gain. Time evolution under irradiation is spliced into deterministic and statistical effects, the latter being responsible for degradation of the surface component. For neutron irradiation, the effects concentrate at the emitter-base function with consequences on the silicon life time degradation. For low geometry transistors, simple electrical criteria were formed for preselection of components before irradiation that rely on relations between breakdown voltage, base diffused dopant concentration, and capacitance of the emitter-base transition zone. The method is, however, not applicable to high geometry transistors. ESRO

N75-14626# Office National d'Etudes et de Recherches Aerospatiales, Toulouse (France). Dept. d'Etudes et de Recherches en Technologie Spatiale.
METAL-INSULATOR TRANSITION IN A HYDROGEN-LIKE DENSE MEDIUM
X. Fortin (CEA, Villeneuve-Saint-Georges, France), P. Pastor, and R. Schuttler (Inst. Natl. des Sci. Appl., Toulouse) May 1974 35 p refs Sponsored in part by DRME
(ONERA-DERTS-NT-02-35) Avail: NTIS HC $3.75

The Hubbard model, which is often used for studying metal-nonmetal transitions, was modified in order to take into account the thermal excitation of electrons into another band with higher energy. These electrons behave as nearly free charge carriers, and their effect on the potential screening modifies the interaction energies . The model leads to a self-consistent calculation which was solved numerically. Results clearly show a form of metal-nonmetal transition phenomenon induced by the mutual influence of the one-electron density of states and the nearly free electron population through the potential screening. Applications to dense hydrogen and to impurities in semiconductors are given. Author (ESRO)

N75-14627# Princeton Univ., N.J. Solid State and Materials Lab.
ANNEALING STUDIES OF Al(+) IMPLANTED SiO2 THIN FILMS
S. Wang, T. Russell, and B. S. H. Royce 30 Aug. 1974 26 p refs Presented at CMOS/SOS Workshop, Washington, D. C., Sep. 1974
(Contract N00014-67-A-0151-0034; DNA Proj. NWER-TD-033)
(AD-785856; PSSL-300874; Rept-1184-AMS) Avail: NTIS CSCL 09/1

The trapping of charge in the amorphous SiO2 layer of metal-oxide-semiconducting devices under ionizing radiation conditions can be modified by implanting the oxide with Al(+) ions. Optical absorption, E.S.R. and MOS capacitance methods have been used to study implantation induced defects in the oxide, the associated change in oxide charge storage and the stability of the defects to post implantation thermal annealing. A simple model of negative charge storage in the implantation zone combined with positive charge storage in the interface regions has been examined. Results of this modeling are discussed. Author (GRA)

N75-14628# Army Foreign Science and Technology Center, Charlottesville, Va.
CHANGES OF THE PHOTOELECTRIC PROPERTIES OF CADMIUM SELENIDE EVAPORATED FILMS DURING ACTIVATION
S. Svechnikov 3 Oct. 1973 8 p refs Transl. into ENGLISH from Ukr. Fiz. Zh. Kiev, v. 17, no. 1 1972 p 106-109
(AD-785992; FSTC-HT-23-1291-73) Avail: NTIS CSCL 20/12

When activating CdSe films by means of diffusion annealing two processes are observed: (a) a sharp increase in the dark resistance during the first 30 min. and (b) a slower change during subsequent annealing during the subsequent 20 hr. A change in resistance during the first process is related to the decrease in concentration of the electrons on the donor admixtures with an activation energy of 0.6-0.7 ev. The mobility of carriers of photoelectric effect at a temperature close to room temperature or higher is on the same order of magnitude as the mobility in monocrystals. The depth of occurrence and the concentration of the adhesion levels are partically invariable during the activation process. GRA

N75-14533 Naval Research Lab., Washington, D.C.
MAGNETO-OPTICAL STUDIES OF SURFACE POLARITONS ON InSb
E. D. Palik and A. Hartstein (Pennsylvania Univ., Philadelphia) *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 46-82 refs (For availability see N75-14531 05-70)

N75-14536 Naval Research Lab., Washington, D.C.
ELECTRIC DIPOLE SPIN-FLIP RESONANCES IN SEMICONDUCTORS
B. D. McCombe *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 146-187 refs (For availability see N75-14531 05-70)

N75-14537 Wuerzburg Univ. (West Germany). Physikalisches Inst.
SURFACE QUANTUM OSCILLATIONS IN SEMICONDUCTORS
G. Landwehr *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 188-220 refs (For availability see N75-14531 05-70)

N75-14539 London Univ. (England). Dept. of Mathematics.
TRANSPORT PROPERTIES OF POLAR SEMICONDUCTORS IN A MAGNETIC FIELD
E. H. Sondheimer *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 240-248 refs (For availability see N75-14531 05-70)

N75-14540 Ecole Normale Superieure, Paris (France). Groupe de Physique des Solides.
ZERO-GAP SEMICONDUCTORS IN HIGH MAGNETIC FIELDS
Wlodek Zawadzki *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 249-256 refs (For availability see N75-14531 05-70)

N75-14541 Oxford Univ. (England). Clarendon Lab.
QUANTUM TRANSPORT AND INFRARED SPECTROSCOPY OF SEMICONDUCTORS
R. A. Stradling *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 257-271 refs (For availability see N75-14531 05-70)

N75-14545 Max-Planck-Institut fuer Festkoerperforschung, Grenoble (France).
RADIATIVE RECOMBINATION OF BOUND EXCITATIONS IN SEMICONDUCTORS WITH Td-SYMMETRY IN MAGNETIC FIELDS
Dieter Bimberg *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 339-369 refs (For availability see N75-14531 05-70)

N75-14550 Oxford Univ. (England). Clarendon Lab.
POLARON EFFECTS IN SEMICONDUCTORS
K. K. Bajaj *In* Wuerzburg Univ. The Appl. of High Magnetic Fields In Semicond. Phys. Aug. 1974 p 437-446 refs (For availability see N75-14531 05-70)

N75-14551 Massachusetts Inst. of Tech., Cambridge. Francis Bitter National Magnet Lab.
RAMAN SCATTERING IN MAGNETIC SEMICONDUCTORS: EuS AND EuSe
V. J. Tekippe, R. P. Silberstein, M. S. Dresselhaus, and R. L. Aggarwal *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 449-469 refs Sponsored by NSF (For availability see N75-14531 05-70)

N75-14552 Wien Univ. (Austria). Ludwig Boltzmann Inst. fuer Festkoerperphysik.
MAGNETOTRANSPORT PROPERTIES OF n-TYPE GaAs IN THE HOPPING RANGE
H. Kahlert *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 470-485 (For availability see N75-14531 05-70)

N75-14553 Polish Academy of Sciences, Warsaw. Inst. of Physics.
HIGH FIELD HOPPING MAGNETORESISTANCE IN GERMANIUM AND THE EFFECTIVE MASS OF BAND CARRIERS
Jan Chroboczek *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 486-491 refs (For availability see N75-14531 05-70)

N75-14554 North Texas State Univ., Denton. Dept. of Physics.
EFFECTS OF UNIAXIAL STRAIN ON THE SHUBNIKOV-de HAAS AND MAGNETO-PHOTON EFFECTS IN SEMICONDUCTORS
D. G. Seiler *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 492-565 refs (For availability see N75-14531 05-70)

N75-14559 Wuerzburg Univ. (West Germany).
SUBMILLIMETER-MAGNETO-SPECTROSCOPY OF SEMICONDUCTORS IN INTENSE MAGNETIC FIELDS
M. V. Ortenberg *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 658-672 refs (For availability see N75-14531 05-70)

N75-14560 Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
THE MAGNETIC ENERGY LEVEL STRUCTURE OF SEMIMETALS IN THE LIMIT OF LOW QUANTUM NUMBER
M. S. Dresselhaus *In* Wuerzburg Univ. The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 673-715 refs Sponsored in part by NSF (For availability see N75-14531 05-70)

N75-14561 Wuerzburg Univ. (West Germany). Physikalisches Inst.
HIGH MAGNETIC FIELD INVESTIGATIONS ON V2-VI3 SEMICONDUCTORS
H. A. Koehler *In its* The Appl. of High Magnetic Fields in Semicond. Phys. Aug. 1974 p 716-738 refs (For availability see N75-14531 05-70)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N75-14629# Iowa State Univ. of Science and Technology, Ames.
THERMAL DIFFUSION IN POLYATOMIC GASES Ph.D. Thesis
M. K. Matzen May 1974 165 p refs
(Contract W-7405-eng-82)
(IS-T-646) Avail: NTIS HC $6.25

Classical kinetic theory is used to determine the transport properties of a multicomponent mixture of polyatomic gases in field-free space and in a constant external magnetic or electric field. Cartesian tensor manipulations required for this analysis are discussed and a general method for reducing a Cartesian tensor into a linear combination of basis tensors for one dimensional irreducible representations of the group C infinity is given. The rigid ellipsoid collision model is used to study thermal diffusive effects of macroscopic and potential parameter variations in binary mixtures of diatomic gases in both field-free space and in an external magnetic field. Calculated thermal diffusion factors are compared with experiment for several different isotopic mixtures of CO in field-free space and the magnetic field effect on thermal diffusion and binary diffusion is examined. For mixtures where the species differ in total mass the rigid ellipsoid model is found to be inadequate for calculating thermal diffusion coefficients. Author

N75-14630# Comitato Nazionale per l'Energia Nucleare, Rome (Italy).
BURN-OUT CORRELATION TO SCALE WATER WITH FREON
M. Cumo, C. Maciuca, M. Moronesi, and G. Palazzi Feb. 1974 65 p refs
(RT/ING-(74)7) Avail: AEC Depository Libraries HC $6.25

A burnout correlation for simple geometries, particularly for once-thorough tubular steam generators with high L/D ratios, was tested against experimental data, both for water and Freon 12. Such a correlation, together with the scaling laws, enables the reproduction, in scaled experimental set-ups, of water burnout tests with Freon. The correlation has the following form: X sub B.O. [1/1 +(C/L sub B)(K)]. The deduced relationships of the parameters C and K, as well as scaler function for the specific mass flowrates and surface heat fluxes, are reported. Author (NSA)

N75-14631# Commissariat a l'Energie Atomique, Grenoble (France).
JUMP CONDITIONS AND ENTROPY SOURCES IN TWO-PHASE SYSTEMS
J. M. Delhaye Jul. 1974 59 p refs In FRENCH
(CEA-R-4562) Avail: AEC Depository Libraries HC $6.00

The systematic formulation of jump conditions and the source of interfacial entropy for two phase systems in the absence of electromagnetic phenomena and chemical and nuclear reactions is reported. Data are also given on surface properties, interfacial tension, and thermodynamic properties. Transl. by E.H.W.

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N75-14632 Advisory Group for Aerospace Research and Development, Paris (France).
AGARD HANDBOOK
Aug. 1974 47 p
(AGARD-Handbook-722.28.00-Rev) Copyright. Avail: Issuing Activity

A handbook on the organization and functions of the Advisory Group for Aerospace Research and Development (AGARD) is presented. The subjects discussed are: (1) the AGARD mission, (2) the AGARD staff, (3) the AGARD panels, (4) the consultant and exchange program, and (5) the AGARD publications. P.N.F.

N75-14633*# Tennessee Univ. Space Inst., Tullahoma.
MANAGEMENT PHILOSOPHIES AS APPLIED TO MAJOR NASA PROGRAMS
Konrad K. Dannenberg Oct. 1974 94 p refs
(Grant NGR-43-001-116)
Avail: NTIS HC $4.75 CSCL 05A

A definition of 'management philosophies' is discussed explaining the position of NASA in the planning and control of space programs and technology. The impact of these philosophies

on the Apollo and Saturn 1 programs are described along with the need for the Saturn 5 spacecraft and launch site development. Case studies are included and describe unscheduled events where management decisions were necessary to keep programs on track. M.C.F.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N75-14634 Academy of Sciences (USSR), Moscow.
PROBLEMS OF CYBERNETIC. DATA COMPRESSION
S. I. Samoylenko, ed. et al 1974 189 p refs In RUSSIAN Copyright. Avail: Issuing Activity

Articles are presented concerning the reduction of data. For individual titles, see N75-14635 through N75-14649.

N75-14635 Academy of Sciences (USSR), Moscow.
REDUCTION OF DATA DURING EXPERIMENTAL INVESTIGATIONS
V. H. Vittikh *In its* Probl. of Cybernetics. Data Compression 1974 p 5-23 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The following methods of data reduction are discussed: deterministic, probability, adaptive, nonadaptive, reversible, irreversible, contour, and structural. It was found that during experimental investigations of transitional dynamic objects, it is expedient to use deterministic adaptive reduction methods. Structural models of signals are suitable for developing methods of irreversible reduction. It is shown that linear algorithms of adaptive discretization are the simplest from the point of view of technical realization, and the corresponding data reduction installations can be constructed according to modular principle. Invariance conditions were achieved by selecting coefficients in a linear structural model. Optimal values of allowable errors during adaptive discretization of multidimensional signal components were produced by using linear programming procedure.
Transl. by M.J.S.

N75-14636 Academy of Sciences (USSR), Moscow.
REDUCTION OF ANALOGOUS SIGNAL FORMS ACCORDING TO DISCRETE READINGS
V. P. Yevdokimov and L. I. Lolesnikov *In its* Probl. of Cybernetics. Data Compression 1974 p 23-33 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

Errors were calculated for signal form reductions which have different correlation functions during the change of interrogation frequency and of the weighting function of the reducing filter. A comparison was made of the computation results in order to produce recommendations for selecting a signal reducing method; that is, the expediency of modifying the reducing filter in order to decrease the error rate was analyzed. Transl. by M.J.S.

N75-14637 Academy of Sciences (USSR), Moscow.
DETERMINING OPTIMAL TIME OF ACCUMULATION DURING REGISTRATION OF PARTICLE FLOW c34
V. F. Babkin *In its* Probl. of Cybernetics. Data Compression 1974 p 33-38 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The reproduction of alternate flow intensity with greater degree of preciseness was investigated. A root-mean-square error for reducing the flow intensity realization was selected as a quantitative measure of preciseness. Conditions were determined during which an optimal time of particle accumulation in a meter exists, corresponding to the minimal error of intensity reproduction. Transl. by M.J.S.

N75-14638 Academy of Sciences (USSR), Moscow.
REDUCTION OF INFORMATION EXCESS DURING INVESTIGATIONS OF QUASI-STATIONARY POISSON PROCESSES ON THE EDGE OF COSMIC APPARATUSES
Ye. M. Vasilyev, V. F. Nilolayev, I. D. Skobkin, Yu. K. Khodarev, and Yu. M. Shtarkov *In its* Probl. of Cybernetics. Data Compression 1974 p 39-44 In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

An algorithm is described for registering the observations of one class of Poisson flows and for permitting the reduction of excess registered data (in a comparison with uniform interrogation.) It was found that the investigated algorithm not only guarantees the given root-mean-square preciseness, but also decreases the excess of data. Transl. by M.J.S.

N75-14639 Academy of Sciences (USSR), Moscow.
ON METHOD OF PROCESSING VECTOR COMMUNICATION
V. G. Sannikov, V. A. Sviridenko, and V. I. Berezin *In its* Probl. of Cybernetics. Data Compression 1974 p 44-53 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

A method was investigated which permits the reduction of excess innate information by using a simple apparatus; the excess was determined by both stochastic associations in different component messages and by reciprocal correlation in coinciding moments of time between different vector communication components. The effectiveness was calculated of the proposed procedure for processing multichannel data, and decreasing the volume of output information flow at a fixed root-mean-square error. Transl. by M.J.S.

N75-14640 Academy of Sciences (USSR), Moscow.
DECORRELATION OF COMMUNICATIONS AND REDUCTION OF DATA AT THE GAUSSIAN SOURCE OUTPUT
N. I. Pilipchuk *In its* Probl. of Cybernetics. Data Compression 1974 p 53-62 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

Data excesses in response to the input signal are considered. It was found that for the Gaussian source, not every decorrelating transformation effectively decreases the excess and some do not cause any data reduction. Decorrelating transformations, data reduction, and the reduction coefficient are discussed. Transl. M.J.S.

N75-14641 Academy of Sciences (USSR), Moscow.
METHODS OF ANALYTICALLY CALCULATING THE EFFECTIVENESS OF APERTURE ALGORITHMS IN DATA REDUCTION
V. A. Sviridenko *In its* Probl. of Cybernetics. Data Compression 1974 p 62-76 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

An approach based on the theory of random process discharges was investigated. It was found that this approach can analyze the effectiveness of aperture algorithms for arbitrary types of predictors, interpolators, and algorithms with the selection of any type of continuous random process as an analog information model. The method based on the concept of equivalence of Gaussian measures produces more complete statistical characteristics of the time between the significant readings. However it puts a limit on the type of algorithm and on the model class to be investigated. Transl. by M.J.S.

N75-14642 Academy of Sciences (USSR), Moscow.
SYSTEM OF DATA CONDENSATION ON THE SIDE OF THE AUTOMATIC INTERPLANETARY STATION (AMS) MARS-3
Ye. M. Vasilyev, V. F. Nikolayev, B.S. Novikov, V. A. Olshevskiy, Yu. K. Khodarev, and Yu. M. Shtarkov *In its* Probl. of Cybernetics. Data Compression 1974 p 76-84 refs In BULGARIAN (For availability see N75-14634 05-82)
Copyright.

It was found that during a Mars 3 spacecraft experiment which studied and simultaneously registered radio emission from the sun, there were some problems with onboard data processing. One of the methods for solving these problems is discussed.

Other topics discussed include: data reduction, data transmission, spaceborne computers, and decoders. Transl. by M.J.S.

N75-14643 Academy of Sciences (USSR), Moscow.
DATA CONDENSATION AND PRECISENESS OF ANALOGOUS SIGNAL REDUCTION
V. P. Yevdokimov *In its* Probl. of Cybernetics. Data Compression 1974 p 84-97 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The reduction of errors in the analog signal form between readings was studied. Its dependence on signal type, approximation method, interrogation frequency, work algorithm for the reduction installation, its threshold, and the reduction coefficient is discussed. The criteria for preciseness are presented.
Transl. by M.J.S.

N75-14644 Academy of Sciences (USSR), Moscow.
INVESTIGATION OF THE EFFECTIVENESS OF A SIMPLE METHOD OF CHROMATOGRAM REDUCTION
V. F. Babkin, A. B. Kryukov, N. Ye. Rybyeva, Z. K. Fedotova, and Yu. M. Shtarkov *In its* Probl. of Cybernetics. Data Compression 1974 p 98-109 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The reduction of chromatographic measurements by using an easily workable method and its modifications was studied. It was found that the use of the suggested algorithms for chromatogram reduction decreased the volume of transferable data during moderate threshold values. The details of the experimental investigation and results are presented.
Transl. by M.J.S.

N75-14645 Academy of Sciences (USSR), Moscow.
REDUCTION OF DISTORTED DISCRETE SEQUENCES WITH MARKOV TYPE SINGLE-CONNECTION LIMITATIONS
Yu. M. Shtarkov and M. M. Lange *In its* Probl. of Cybernetics. Data Compression 1974 p 110-129 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

A decoding algorithm was developed as a generalized algorithm for reducing monotonic sequences and can be used for any sequences with single-channel limitations of the Markov type. It was found that the excess of sequences can be applied to correcting errors originating in the communication channel.
Transl. by M.J.S.

N75-14646 Academy of Sciences (USSR), Moscow.
ANALYZING THE INFLUENCE OF A BUFFER MEMORY'S FINITE CAPACITY AND OF COMMUNICATION CHANNEL ERRORS ON THE CHARACTERISTICS OF A DATA CONDENSATION SYSTEM
V. A. Sviridenko *In its* Probl. of Cybernetics. Data Compression 1974 p 130-143 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

A method was proposed which evaluates noise proof characteristics and energetic effectiveness, analyzes the existing data reduction systems, and compares different analog data transmission systems in digital form without the generally accepted limitations on the channel type and the buffer memory device capacity. Other topics discussed include: noise levels, coding, vector message transmission, and single-dimension analog data.
Transl. by M.J.S.

N75-14647 Academy of Sciences (USSR), Moscow.
EFFECTIVENESS OF A SIMPLE METHOD OF SYNCHRONIZING REGULAR AND IRREGULAR CODES
Yu. M. Shtarkov *In its* Probl. of Cybernetics. Data Compression 1974 p 143-154 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

It was found that as a result of data reduction, the lengths of various code words became nonuniform. The addition of a prefix to accomplish synchronization of regular and irregular codes was studied. An expression was produced for optimal value of the threshold, and the asymptotic excess was evaluated of this simple method of synchronization during an increase in the average length of a code word.
Transl by M.J.S.

N75-14648 Academy of Sciences (USSR), Moscow.
DUAL-PHASE MODEL OF A DATA REDUCTION SYSTEM
Ye. I. Ruchka and N. Ya. Polonskaya *In its* Probl. of Cybernetics. Data Compression 1974 p 154-171 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The productivity of a system in a determined flow of information during given processing installation parameters, and the connections between them were investigated. A formal model of a data reduction system and the determination of stationary probabilities are presented.
Transl. by M.J.S.

N75-14649 Academy of Sciences (USSR), Moscow.
ANALYZING BLOCKING CONDITIONS OF INSTALLATIONS OF A DATA REDUCTION SYSTEM
N. Ya. Polonskaya and Ye. I. Ruchka *In its* Probl. of Cybernetics. Data Compression 1974 p 171-184 refs In RUSSIAN (For availability see N75-14634 05-82)
Copyright.

The influence of absolute and relative blocking of auxiliary assemblies on the system's quality indicators was investigated. It was found that the relative blocking improves the quality of service of the external and internal flow and that absolute blocking should be avoided by using recorders or buffer accumulators. Other topics discussed included: formal models, Markov chains, and determination of stationary probabilities. Transl by M.J.S.

N75-14650# Air Force Human Resources Lab., Brooks AFB, Tex.
SYLLABUS AND SYLLABUS DEVELOPMENT TECHNIQUES USED IN EVALUATING THE A/F37A/T-4G FLIGHT SIMULATOR Final Report
Steven K. Rust, James F. Smith, and Robert R. Woodruff Jun. 1974 36 p
(AF Proj. 1123)
(AD-786412; AFHRL-TR-74-44) Avail: NTIS CSCL 05/9

The report describes the A/F37A/T-4G (T-4G) simulator syllabus developed by the Flying Training Division of the Air Force Human Resources Laboratory, to demonstrate the effectiveness of a limited visual, limited motion flight simulator in T-37 undergraduate pilot training. This report describes the syllabus development procedures employed, clarifies the resulting syllabus content and format, and provides a guide for development of future special purpose syllabi.
Author (GRA)

N75-14651# Radiation, Inc., Melbourne, Fla.
HUMAN READ/MACHINE READ INFORMATION PROCESSOR SYSTEM Final Report, Jun. 1971 - Jan. 1974
A. K. Gillis Jun. 1974 95 p refs
(Contract F30602-71-C-0326)
(AD-786425; RADC-TR-74-152) Avail: NTIS CSCL 09/2

The Human Read/Machine Read (HRMR) Microfilm Memory System was developed. The equipment is intended to be an initial step toward a mass memory microfilm data storage and retrieval system. The HRMR System is composed of functional modules. Basic modules are the Recorder, Reader, Controller, Graphic Arts Scanner (digitizer), and a Microfiche Storage and Retrieval Module were implemented on this program. Although there are many reasons for considering holographic methods for use in storing data, the principal reason is to achieve a system that can store large quantities of data in a low-cost, compact, reliable system from which the data can be easily retrieved. The HRMR System machine read recording concept accomplishes this objective by providing high density storage of binary data while facilitating rapid readout at low error rates. The report summarizes the activities of the HRMR program and describes the equipment which was developed. (Modified author abstract)
GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N75-14652# Atomic Energy Commission, Washington, D.C. Directorate of Licensing.
LEGISLATION TO AMEND THE PRICE-ANDERSON ACT Draft Environmental Statement
May 1974 124 p refs
(WASH-1328) Avail: NTIS HC $5.25

The proposed action is enactment of legislation to amend the Price-Anderson Act (section 170 of the Atomic Energy Act of 1954, as amended, 42 USC 2210). The requirement of the Act that certain licensees provide financial protection and be indemnified for public liability claims arising out of a nuclear incident would be extended for ten years, from August 1, 1977 to August 1, 1987. The legislation would provide a mechanism whereby increased financial protection made available by the nuclear insurance industry can be the mid-1980s phase out government indemnity now provided through appropriated funds. For those AEC licensees or contractors required to maintain financial protection equal to the maximum amount of liability insurance available from private sources the proposed legislation would provide for a limitation of liability equal to $560 million or the maximum amount of financial protection available, whichever is more. Author (NSA)

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

N75-14653# Cranfield Inst. of Technology (England). Centre for Transport Studies.
SUPERCONDUCTING MAGNET SUSPENSIONS IN HIGH SPEED GROUND TRANSPORT
I. A. Alston Aug. 1973 135 p refs
(CTS-5) Avail: NTIS HC $5.75

A technical and economic definition of high speed ground transport systems using magnetic suspensions is given. The full range of common superconducting suspensions and of propulsions are covered with designs produced for speeds ranging from 100 m/s (225 miles/hr) to 250 m/s (560 mile/hr). Technical descriptions of the vehicles, their suspensions, propulsions and tracks are given in some detail and operating costs are presented for all the systems together with details of the breakdown of costs and the capital costs involved. The design assumptions, the costing procedure and a cost sensitivity study are presented. It is concluded that the systems are technically feasible; that they are suited to existing duorail track for low speed running and that, in these circumstances, they would be economically viable over many routes. Author

N75-14654# Transportation Systems Center, Cambridge, Mass.
ANALYSIS OF DUAL MODE SYSTEMS IN AN URBAN AREA. VOLUME 1: SUMMARY Final Report, Aug. 1971 - Aug. 1972
Peter Benjamin, J. Barber, R. Favout, D. Goeddel, C. Heaton, R. Kangas, G. Paules, E. Roberts, and L. Vance Dec. 1973 41 p refs Sponsored by DOT
(PB-236425/5; DOT-TSC-OST-73-16A-Vol-1-Rev) Avail: NTIS HC $3.75 CSCL 13F

Various forms of Dual Mode transportation were analyzed in order to assess the economic viability of the Dual Mode concept. Specially designed new-small Dual Mode vehicles, modifications of existing automobiles, and pallet systems, all operating in conjunction with Dual Mode buses were examined. The following conclusions are considered to be generally applicable to other large urban areas as well: (a) Dual Mode systems appear to be sufficiently attractive to warrant further technological development; (b) for urban-wide applications, a Dual Mode system which includes both buses and personal vehicles is more effective than one consisting of either fleet of vehicles alone. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N75-14655# State Univ. of New York, Stony Brook. Dept. of Earth and Space Sciences.
INFRARED OBSERVATIONS OF THE SURFACE AND ATMOSPHERE OF TITAN
R. F. Knacke, T. Owen, and R. R. Joyce (Kitt Peak Natl. Obs.) [1974] 15 p refs
Avail: NTIS HC $3.25

Infrared photometry of Titan, Saturn, and Saturn's Rings at 3.5, 4.9, 17.8, and 18.4 microns is reported. Comparisons of the albedo of Titan in the 4.9 microns window with the albedo of the rings and with laboratory spectra suggests that frost, possibly water ice, could be a major constituent. If thick clouds are present they must be very dark at 4.9 microns. The 17.8 and 18.4 microns data are not consistent with a clear, dense molecular hydrogen atmosphere. Author

N75-14656*# Arizona Univ., Tucson.
INFRARED OBSERVATIONS OF THE PLANETS Final Report, 1 Mar. 1973 - 28 Feb. 1974
Frank J. Low 28 Feb. 1974 26 p refs
(Grant NGR-03-002-356)
(NASA-CR-141288) Avail: NTIS HC $3.75 CSCL 03A

The planetary observations presented are divided into three parts: (1) infrared photometry at all wavelengths accessible from the ground; (2) high resolution infrared mapping of Jupiter with special emphasis at 5 microns; and (3) extensive infrared observations of Comet Kohoutek. Results are briefly summarized. Author

N75-14657*# Maryland Univ., College Park. Clark Lake Radio Observatory
A NEW WIDEBAND, FULLY STEERABLE, DECAMETRIC ARRAY AT CLARK LAKE Final Technical Report, period ending Feb. 1974
William C. Erickson and J. Richard Fisher (National Radio Astronomy Obs.) 3 May 1974 58 p refs
(Grant NGR-21-002-029)
(NASA-CR-141187) Avail: NTIS HC $4.25 CSCL 03A

A fully steerable, decametric array for radio astronomy is under construction at the Clark Lake Radio Observatory near Borrego Springs, California. This array will be a T of 720 conical spiral antennas (teepee-shaped antennas, hence the array is called the TPT), 3.0 km by 1.8 km capable of operating between 15 and

125 MHz. Both its operating frequency and beam position will be adjustable in less than one millisecond, and the TPT will provide a 49-element picture around the central beam position for extended source observations. Considerable experience was gained in the operation of completed portions of the array, and successful operation of the final array is assured. The results are described of the tests which were conducted with the conical spirals, and the planned electronics and data processing systems are described. Author

N75-14658# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
PROPOSITION FOR PARTICIPATION IN THE LST PROJECT
G. Courtes and P. Cruvellier 31 Jan. 1973 27 p refs
(LAS-73-DRT-PRJ-01) Avail: NTIS HC $3.75

Proposals for the improvement of the LST instrumentation are presented. In order to eliminate the bright part of the star and take full advantage of the diffraction limited camera, a stellar coronagraph is proposed. A summary research program in this embodiment is proposed. In the 1 deg or 2 deg resolution mode for the LST a focal reducer is proposed leading to a F/2 focal ratio thus increasing the extended source detection by a factor of 144. The proposed instrument is described together with various detectors, such as objective grating or prism and Fabry-Perot spectrometers for near IR to near UV research in low to medium spectral resolution. ESRO

N75-14659# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
PHOTOGRAPHIC FAUST. INSTRUMENT PAYLOAD INTERFACES [FAUST PHOTOGRAPHIQUE. INTERFACES C.U. INSTRUMENT]
H. Barreau, ed. 18 Jan. 1973 23 p In FRENCH
(LAS-73-ELC-FAU-017) Avail: NTIS HC $3.25

The electric interfaces exterior to the FAUST spaceborne telescope are described. The interfaces are divided into control and command, pyrotechnics, telemetry, and ground tests. The functions and electrical characteristics of each connection are specified. ESRO

N75-14660# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
CALIBRATING OF THE ELZ MEX (FIRST SERIES OF MEASUREMENTS) [CALIBRATION ELZ MEX PREMIERE SERIE DE MESURES]
23 May 1973 145 p In FRENCH
(LAS-OPT-029-73) Avail: NTIS HC $5.75

The ELZ Mex flight prototypes were calibrated and the centerline and static pass band efficiencies were determined using a test grating for a quasi point source in monochromatic light and for an extended source. For each of the four channels of the instrument, the static (star) passband, extended source passband, and monochromatic slit height were determined. ESRO

N75-14661# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
STAR FILE EXPLOITATION ON IBM 1130 COMPUTER EX SAO STAR CATALOGUE [EXPLOITATION DE FICHIERS D'ETOILES ISSUS DU CATALOGUE SAO SUR L'ORDINATEUR IBM 1130 DU LAS (ETAPE TRANSITOIRE)]
J. C. Gonin 10 Feb. 1973 34 p In FRENCH
(LAS-CLC-01) Avail: NTIS HC $3.75

The computer programs used to retrieve on disks the content of a portion of the SAO star catalog are presented. File data are detailed and the star partition is explained leaving out stars of visual magnitude higher than 9.0. The implementation rules of the program are described within the input routine. Examples of program listing, results, and disk organization are given. ESRO

N75-14662# Aerospace Corp., El Segundo, Calif. Lab. Operations.
A CATALOG OF 10 MICROMETER CELESTIAL OBJECTS
Richard T. Hall 15 Sep. 1974 143 p refs
(Contract F04701-74-C-0075)
(AD-786780; TR-0075(5142-02)-1; SAMSO-TR-74-212) Avail: NTIS CSCL 03/2

This catalog is a compilation of observations of 647 celestial objects reported in 97 articles in the open literature with measured infrared emissions at or near 10 micrometers. The source name, the equatorial and galactic coordinates, and the infrared flux of each object are given. This catalog is a revision of a catalog of 383 10-micrometers objects published in 1972. Author (GRA)

N75-14663# Army Foreign Science and Technology Center, Charlottesville, Va.
BAND IRRADIATOR WITH ELECTRICAL SCANNING OF RADIATION PATTERN
S. N. Ivanov, Yu. P. Ilyasov, and G. N. Khramov 27 Apr. 1974 28 p refs Transl. into ENGLISH from Tr. Fiz. Inst., Akad. Nauk SSSR (Moscow), v. 28, 1965 p 22-38
(AD-786036; FSTC-HT-23-204-74) Avail: NTIS CSCL 03/2

Development of a band irradiator for the North-South line of the cross-shaped radiotelescope of the Physics Institute imeni P. N. Lebedev of the U.S.S.R. Academy of Sciences is discussed. It is shown theoretically possible to build a feeder system permitting a significant reduction in systematic errors arising in the amplitude-phase distribution at the irradiator when there is a mismatch in vibrators with the supply feeder in an assigned radiation pattern scanning sector. GRA

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N75-14664*# Techtran Corp., Glen Burnie, Md.
INTRODUCTION TO THE DYNAMICS OF PLANETARY ATMOSPHERES
G. S. Golitsyn Washington NASA Dec. 1974 103 p refs Transl. into ENGLISH of the book "Vvedeniye v Dinamiku Planetnykh Atmosfer" Leningrad, Gidrometeoizdat, 1973 103 p
(Contract NASw-2485)
(NASA-TT-F-15627) Avail: NTIS HC $5.25 CSCL 03B

A new general theory is described of circulation in planetary atmospheres, one developed on the basis of consistent use of similarity and dimensional arguments supplemented by energy and thermodynamic considerations. The causes and nature of motions of various scales are discussed, observational, numerical, and laboratory methods of studying meteorological fields are described, and a survey is given of astronomical and atmospheric parameters for various planets of the solar system. Author

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N75-14665*# Geological Survey, Washington, D.C.
ATLAS OF SURVEYOR 5 TELEVISION DATA
Raymond M. Batson, Raymond Jordan, and Kathleen B. Larson NASA 1974 609 p refs Sponsored by NASA
(NASA-SP-341; LC-74-600024) Avail: NTIS MF $2.25; SOD HC $14.40 CSCL 03B

This atlas is a compendium of the Surveyor 5 television mosaics. It it divided into two main sections. The first consists of improved mosaics of panoramas and basic cartographic data used in investigating surface detail, and the second contains individual frame data, including photoindex mosaics and tabulations in which individual frames are identified. A short section containing a set of special-purpose mosaics assembled by the staff of the Jet Propulsion Laboratory is also included. For more details about the Surveyor 5 mission, television data, or science results, a brief bibliography is included. Author

N75-14666*# Texas A&M Univ., College Station. Dept. of Chemistry.
THERMOMAGNETIC ANALYSIS OF METEORITES. 4: UREILITES
M. W. Rowe, J. M. Herndon, E. E. Larson (Cooperative Inst. for Research in Environmental Sciences, Boulder, Colo.), and D. E. Watson (Geological Survey, Boulder, Colo.) [1974] 13 p refs (Grants NGR-06-003-181; NGR-44-001-152; NSF GP-18716) (NASA-CR-141143) Avail: NTIS HC $3.25 CSCL 03B

Samples of all available ureilites have been analyzed thermomagnetically. For three of the six (Dyalpur, Goalpara and Havero) evidence was found for only low-nickel metallic-iron as the magnetic component and the (saturation magnetization vs. temperature) curves were reversible. In the Novo Urei ureilite, magnetite in addition to low-nickel metallic-iron was indicated and again the Js-T curve was reversible. For the two badly weathered ureilites, Dingo Pup Donga and North Haig, indication was also found that both initial magnetite and low-nickel metallic-iron were present. However, the Je-T curves were somewhat irreversible and the final saturation magnetization was 20% and 50% greater than initially for North Haig and Dingo Pup Donga, respectively. This behavior is interpreted to be the result of magnetite production from a secondary iron oxide during the experiment. Author

N75-14667*# Texas A&M Univ., College Station.
THERMOMAGNETIC ANALYSIS OF METEORITES. 3: C3 AND C4 CHONDRITES
J. M. Herndon, M. W. Rowe, E. E. Larson (Colorado Univ., Boulder), and D. E. Watson (US Geological Survey, Boulder) [1974] 15 p refs
(Grants NGR-06-003-181; NGR-44-001-152; NSF GP-18716) (NASA-CR-141145) Avail: NTIS HC $3.25 CSCL 03B

Thermomagnetic analysis on all of the C3 and C4 chondrites, conducted under conditions of controlled oxygen fugacity, indicates the presence of a thermally unstable component in at least 5 of the C3 chondrites which upon heating results in magnetite production. This unstable component is most likely troilite (FeS). The presence of the unstable substance may affect the estimation of paleointensities in meteorites which contain it. Our results indicate that Grosnaja, Ornans, Kainsaz, Felix, and Warrenton are likely to be less complicated for paleointensity determinations than the other C3 chondrites. Both C4 chondrites should lead to reliable results. Author

N75-14668*# Texas A&M Univ., College Station. Nuclear-Geochemistry Dept. of Chemistry.
THE MAGNETIZATION OF CARBONACEOUS METEORITES Ph.D. Thesis
James Marvin Herndon Aug. 1974 124 p refs Sponsored in part by NASA and NSF
(NASA-CR-141169) Avail: NTIS HC $5.25 CSCL 03B

Alternating field demagnetization experiments have been conducted on representative samples of the carbonaceous meteorites (carbonaceous chondrites and ureilites). The results indicate that many, if not all, of these meteorites possess an intense and stable magnetic moment of extraterrestrial origin. Thermomagnetic analyses have been conducted on samples of all known carbonaceous meteorites. In addition to yielding quantitative magnetite estimates, these studies indicate the presence of a thermally unstable component, troilite, which reacts with gaseous oxygen to form magnetite. It is proposed that the magnetite found in some carbonaceous chondrites resulted from the oxidation of troilite during the early history of the solar system. The formation of pyrrhotite is expected as a natural consequence of magnetite formation via this reaction. Consideration is given to the implications of magnetite formation on paleointensity studies. Author

N75-14669*# Texas A&M Univ., College Station. Dept. of Chemistry.
CORRELATION OF THERMOMAGNETIC BEHAVIOR OF CARBONACEOUS CHONDRITES WITH CHEMICAL PETROGRAPHIC CLASSIFICATION
M. W. Rowe [1974] 10 p refs
(Grant NGR-44-001-152)
(NASA-CR-141060) Avail: NTIS HC $3.25 CSCL 03B

Some degree of correlation was noted between the thermomagnetic behavior of the carbonaceous chondrites and the chemical-petrographic classification scheme of Van Schmus and Hayes. Author

N75-14670*# National Aeronautics and Space Administration, Washington, D.C.
THE PLANETARY QUARANTINE PROGRAM: ORIGINS AND ACHIEVEMENTS, 1956 - 1973
Charles R. Phillips 1974 61 p refs
(NASA-SP-4902; LC-74-600134) Avail: NTIS MF $2.25; SOD HC $0.85 CSCL 03B

United States effort in planetary quarantine is outlined, beginning with the expressions of alarm by biologists, then discussing how a program was put together and implemented, and finally indicating the academic, governmental, institutional, and industrial agencies and people involved. It ends with a brief summary of the accomplishments and present status of the Planetary Quarantine Program and will serve as a partial explanation of how the planetary quarantine effort evolved and reached its present position. Author

N75-14671*# Harvard Coll. Observatory, Cambridge, Mass.
A SURVEY OF LUNAR ROCK TYPES AND COMPARISON OF THE CRUSTS OF EARTH AND MOON
John A. Wood Houston, Tex. NASA 1974 40 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA
(NASA-CR-141260; Rept-227) Avail: NTIS HC $3.75 CSCL 08M

The principal known types of lunar rocks are briefly reviewed, and their chemical relationships are discussed. Author

N75-14672*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA USERS NOTE: APOLLO 17 LUNAR PHOTOGRAPHY
Winifred Sawtell Cameron, Frederick J. Doyle (Geological Survey, Washington, D. C.), Leon Levenson, and Kenneth Michlovitz (PMI Facilities Management Corp.) Dec. 1974 69 p refs
(NASA-TM-X-72535; NSSDC-74-08) Avail: NTIS HC $4.25 CSCL 03B

The availability of Apollo 17 pictorial data is announced as an aid to the selection of the photographs for study. Brief descriptions are presented of the Apollo 17 flight, and the photographic equipment used during the flight. The following descriptions are also included: service module photography, command module photography, and lunar surface photography. F.O.S.

N75-14673*# Chicago Univ., Ill.
METEORITIC MATERIAL ON THE MOON
John W. Morgan, R. Ganapathy, Hideo Higuchi, and Edward Anders Houston, Tex. NASA 1974 63 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Grant NGL-14-001-167)
(NASA-CR-141242; Rept-202) Avail: NTIS HC $4.25 CSCL 03B

Micrometeorites, ancient planetesimal debris from the early intense bombardment, and debris of recent, crater-forming projectiles are discussed and their amounts and compositions have been determined from trace element studies. The micrometeorite component is uniformly distributed over the entire lunar surface, but is seen most clearly in mare soils whereas, the ancient component is seen in highland breccias and soils. A few properties of the basin-forming objects are inferred from the trace element data. An attempt is made to reconstruct the bombardment history of the moon from the observation that only basin-forming objects fell on the moon after crustal differentiation. The apparent half-life of basin-forming bodies is close to the calculated value for earth-crossing planetesimals. It is shown that a gap in radiometric ages is expected between the Imbrium and Nectaris impacts, because all 7 basins formed in this interval lie on the farside or east limb. Author

N75-14674*# California Inst. of Tech., Pasadena. Seismological Lab.

FORMATION AND COMPOSITION OF THE MOON

Don L. Anderson Houston, Tex. NASA 1974 60 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974

(Grant NGL-05-002-069)

(NASA-CR-141244; Rept-203) Avail: NTIS HC $4.25 CSCL 03B

Many of the properties of the moon are discussed including the enrichment in Ca, Al, Ti, U, Th, Ba, Sr and the REE and the depletion in Fe, Rb, K, Na and other volatiles which could be understood if the moon represents a high temperature condensate from the solar nebula. Thermodynamic calculations show that Ca, Al and Ti rich compounds condense first in a cooling nebula. The initial high temperature mineralogy is gehlenite, spinel, perovskite, Ca-Al-rich pyroxenes and anorthite. Inclusions in Type III carbonaceous chondrites such as the Allende meteorite are composed primarily of these minerals and, in addition, are highly enriched in refractories such as REE relative to carbonaceous chondrites. These inclusions can yield basalt and anorthosite in the proportions required to eliminate the europium anomaly, leaving a residual spinel-melilite interior. Author

N75-14675*# Chicago Univ., Ill.

HETEROGENEITIES IN THE SOLAR NEBULA

Robert Clayton, Lawrence Grossman, Toshiko K. Mayeda, and Naoki Onuma (Tokyo Gakugei Univ.) Houston, Tex. NASA 1974 14 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA

(NASA-CR-141243; Rept-204) Avail: NTIS HC $3.25 CSCL 03B

Oxygen isotopic compositions of the high-temperatue phases in carbonaceous chondrites define a mixing line with an O-16 rich component and show little superimposed chemical isotope fractionation. Within a single inclusion in Allende, variations of delta O-18 and delta O-17 of 39% are found. The ordinary chondrites are slightly displaced from the terrestrial fractionation trend, implying that at least 0.2% of the oxygen in terrestrial rocks was derived from the O-16 rich component. Author

N75-14676*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TELEVISION OBSERVATIONS OF MERCURY BY MARINER 10

Bruce C. Murray (Calif. Inst. of Tech., Pasadena), Michael J. S. Belton (Kitt Peak Natl. Obs., Tucson), G. Edward Danielson (JPL), Merton E. Davies (Rand Corp., Santa Monica, Calif.), Donald E. Gault, Bruce Hapke (Pittsburgh Univ.), Brian OLeary (Hampshire Coll., Amherst), Robert G. Strom (Arizona Univ., Tucson), Verner Suomi (Wisconsin Univ., Madison), and Newell Trask (US Geological Survey, Reston, Va.) Houston, Tex. 1974 50 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974

(NASA-TM-X-72193; Rept-206) Avail: NTIS HC $3.75 CSCL 03B

The morphology and optical properties of the surface of Mercury resemble that of the moon in remarkable detail, recording a very similar sequence of events; chemical and mineralogical similarity of the outer layers is implied. Mercury is probably a differentiated planet with an iron-rich core. Differentiation is inferred to have occurred very early. No evidence of atmospheric modification of any landform is found. Large-scale scarps and ridges unlike lunar or Martian features may reflect a unique period of planetary compression near the end of heavy bombardment, perhaps related to contraction of the core. Author

N75-14677*# Chicago Univ., Ill. Dept. of the Geophysical Sciences.

CHEMICAL FRACTIONATION IN THE SOLAR NEBULA

Lawrence Grossman Houston, Tex. NASA 1974 27 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by Res. Corp.

(Grant NGR-14-001-249)

(NASA-CR-141257; Rept-207) Avail: NTIS HC $3.75 CSCL 03B

The sequence of condensation of minerals from a cooling gas of solar composition has been calculated from thermodynamic data assuming complete chemical equilibrium is maintained. The results suggest that the Ca-Al-rich inclusions in Allende and other carbonaceous chondrites are aggregates of the highest temperature condensates. Complete condensation of these elements is followed 100 deg later, by the onset of the crystallization of nickel-iron, forsterite and enstatite. Transport of Ca-Al-rich refractory condensates from one part of the nebula to another before the condensation of these lower-temperature phases may have been responsible for the refractory element fractionations between the different classes of chondrites and possibly for the inferred refractory element enrichment of the moon. Author

N75-14678*# Harvard Univ., Cambridge, Mass.

LUNAR IGNEOUS ROCKS AND THE NATURE OF THE LUNAR INTERIOR

James Fred Hays and David Walker Houston, Tex. NASA 30 Jul. 1974 33 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochemistry of the Moon and Planets, Moscow, 4-8 Jun. 1974

(Grant NGL-22-007-247)

(NASA-CR-141245; Rept-208) Avail: NTIS HC $3.75 CSCL 03B

Lunar igneous rocks are interpreted, which can give useful information about mineral assemblages and mineral chemistry as a function of depth in the lunar interior. Terra rocks, though intensely brecciated, reveal, in their chemistry, evidence for a magmatic history. Partial melting of feldspathic lunar crustal material occurred in the interval 4.6 to 3.9 gy. Melting of ilmenite-bearing cumulates at depths near 100 km produced parent magmas for Apollo 11 and 17 titaniferous mare basalts in the interval 3.8 to 3.6 gy. Melting of ilmenite-free olivine pyroxenites at depths greater than 200 km produced low-titanium mare basalts in the interval 3.4 to 3.1 gy. No younger igneous rocks have yet been recognized among the lunar samples and present-day melting seems to be limited to depths greater than 1000 km. Author

N75-14679*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

THE MICROMETEOROID COMPLEX AND EVOLUTION OF THE LUNAR REGOLITH

F. Hoerz, D. A. Morrison, D. E. Gault, V. R. Oberbeck, W. L. Quaide, J. F. Vedder, D. E. Brownlee (Washington Univ., Seattle), and J. B. Hartung (Max-Plank-Inst. fur Kernphys.) 1974 85 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974

(NASA-TM-X-72191; Rept-210) Avail: NTIS HC $4.75 CSCL 03B

The interaction of the micrometeoroid complex with the lunar surface is evidenced by numerous glass-lined microcraters on virtually every lunar surface exposed to space. Such craters range in size from less than .1 micron to approximately 2 sq cm diameter. Using small scale laboratory cratering experiments for calibration, the observed crater-sized frequency distributions may be converted into micrometeoroid mass distributions. These lunar mass distributions are in essential agreement with satellite data. Some physical properties of micrometeoroids may be deduced by comparing lunar crater geometries with those obtained in laboratory experiments. The preponderance of circular outlines of lunar microcraters necessitates equidimensional, if not spherical, micrometeoroids. Author

N75-14680*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

A CHEMICAL MODEL FOR LUNAR NON-MARE ROCKS

Norman J. Hubbard and J. Michael Rhodes (Lockheed Electronics Corp., Houston, Tex.) 1974 43 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974

(NASA-TM-X-72190; Rept-211) Avail: NTIS HC $3.75 CSCL 03B

Nearly all rocks returned from the moon are readily divided into three broad categories on the basis of their chemical compositions: (1) mare basalts, (2) non-mare rocks of basaltic composition (KREEP, VHA), and (3) anorthositic rocks. Only mare basalts may unambiguously be considered to have original igneous

textures and are widely understood to have an igneous origin. Nearly all other lunar rocks have lost their original textures during metamorphic and impact processes. It is shown that for these rocks one must work primarily with chemical data in order to recognize and define rock groups and their possible modes of origin. Non-mare rocks of basaltic composition have chemical compositions consistent with an origin by partial melting of the lunar interior. The simplest origin for rocks of anorthositic chemical composition is the crystallization and removal of ferromagnesian minerals. It is proposed that the rock groups of anorthositic and non-mare basaltic chemical composition could have been generated from a single series of original but not necessarily primitive lunar materials. Author

N75-14681*# Geological Survey, Reston, Va.
LUNAR HIGHLANDS BRECCIAS GENERATED BY MAJOR IMPACTS
Odette B. James Houston, Tex. NASA 1974 51 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA Order T-2357-A)
(NASA-CR-141172; Rept-212) Avail: NTIS HC $4.25 CSCL 03B

Lunar missions are reported which have returned a variety of different types of breccias. These rocks differ greatly in their mechanisms of formation, source materials, and histories after formation; but all are related in that all were generated by impact processes. The impact processes involved in the formation of several major types of breccias are discussed. Some types that may have originated in large impacts are identified. Such breccias are extremely important. The impacts that formed them penetrated deeply into, and perhaps through the lunar crust and brought up materials that had previously experienced little or no impact modification. Detailed studies of such breccias can permit partial reconstruction of their preimpact source terranes and yield information on the nature of the early lunar crust (and possibly the upper mantle as well). Author

N75-14682*# California Univ., Los Angeles.
MECHANICAL PROCESSES AFFECTING DIFFERENTIATION OF PROTO-LUNAR MATERIAL
W. M. Kaula Houston, Tex. NASA 1974 20 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Grant NGL-05-007-002)
(NASA-CR-141171; Rept-213) Avail: NTIS HC CSCL 03B

Mechanisms prior to lunar formation are sought to account for the loss of volatiles, the depletion of iron, and the enrichment of plagioclase. Some of the same mechanisms are necessary to account for achondritic, stony-iron, and iron meteorites. Collisions seem marginally capable of providing the heat to accomplish the differentiation into iron, magnesian silicates, and plagioclase. Once this differentiation is accomplished, the subsequent mechanical history should have been sufficient to sort material according to composition in the proto-lunar circum-terrestrial cloud. Effects operating include the correlation of body size with mechanical strength; the lesser ability of the cloud to trap the larger, denser infalling bodies; the more rapid drawing into the earth of the larger moonlets; and the higher energy orbits for dominantly plagioclase smaller pieces broken off by collision. Author

N75-14683*# Texas Univ., Galveston.
RESULTS FROM THE APOLLO PASSIVE SEISMIC EXPERIMENT
Gary Lathum, Yosio Nakamura, James Dorman, Frederick Duennebier, Maurice Ewing, and David Lammlein Houston, Tex. NASA 1974 36 p refs Presented at Proc. of the Soviet-Am. Conf. on the Coschem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Contract NAS9-13143)
(NASA-CR-141256; Contrib-44; Rept-214) Avail: NTIS HC $3.75 CSCL 03B

Recent results from the Apollo seismic network suggest that primitive differentiation occurred in the outer shell of the moon to a depth of approximately 300 km; and the central region of the moon is presently molten to a radius of between 200 and 300 km. If early melting to a depth of 300 to 400 km was a consequence of accretional energy, very short accretion times are required. The best model for the zone of original differentiation appears to be a crust 40 to 80 km thick, ranging in composition from anorthositic gabbro to gabbro; overlying an ultramafic cumulate (olivine-pyroxene) about 250 km thick. The best candidate for the molten core appears to be iron or iron sulphide. A new class of seismic signals has recently been identified that may correspond to shallow moonquakes. These are rare, but much more energetic than the more numerous, deep moonquakes. Author

N75-14684*# Lamont-Doherty Geological Observatory, Palisades, N.Y.
IN-SITU MEASUREMENTS OF LUNAR HEAT FLOW
Marcus G. Langseth and Stephen J. Keihm Houston, Tex. NASA 1974 34 p refs Presented at Proc. of the Soviet-AM. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Contract NAS9-6037)
(NASA-CR-141255; Contrib-2141; Rept-215) Avail: NTIS HC $3.75 CSCL 03B

During the Apollo program two successful heat flow measurements were made in situ on the lunar surface. At the Apollo 15 site a value of 0.0000031 watts/sqcm was measured and at the Apollo 17 site a value of 0.0000022 watts/sqcm was determined. Both measurements have uncertainty limits of + or - 20% and have been corrected for perturbing topographic effects. The apparent difference between the observations may correlate with observed variations in the surface abundance of thorium. Comparison with earlier determinations of heat flow, using the microwave emission spectrum from the moon, gives support to the high gradients and heat flows observed in situ. Author

N75-14685*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
LUNAR HIGHLAND ROCK TYPES: THEIR IMPLICATIONS FOR IMPACT INDUCED FRACTIONATION
W. C. Phinney, J. L. Warner, and C. H. Simonds 1974 82 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Contract NSR-09-051-001)
(NASA-TM-X-72194; Rept-218) Avail: NTIS HC $4.75 CSCL 03B

The first step in a petrologic study must be a classification based on observed textures and mineralogy. Lunar rocks, may be classified into three major groups: (1) coarse-grained igneous rocks, (2) fine-grained igneous rocks and (3) breccias. Group 1 is interpreted as primitive lunar crustal rocks that display various degrees of crushing and/or annealing. Group 2 is interpreted as volcanic rocks. Group 3 is interpreted as resulting from impacts on the lunar surface and is subdivided on the basis of matrix textures into fragmental breccias, crystalline breccias that have been annealed, and crystalline breccias with igneous matrices. A synthesis of the relevant data concerning lunar highlands polymict breccias from the fields of petrography, chemistry, photogeology, and impact studies compels the prediction that the breccias should have homogeneous matrices from rock to rock within regions of the highlands of limited size where impact mixing has been efficient and extensive. Author

N75-14686*# New Mexico Univ., Albuquerque. Dept. of Geology.
COMPARISON OF LUNAR ROCKS AND METEORITES: IMPLICATIONS TO HISTORIES OF THE MOON AND PARENT METEORITE BODIES
Martin Prinz, R. V. Fodor, and Klaus Keil Houston, Tex. NASA 1974 47 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Grants NGL-32-004-063; NGL-32-004-064)
(NASA-CR-141246; Rept-219) Avail: NTIS HC $3.75 CSCL 03B

A number of similarities between lunar and meteoritic rocks are reported and suggest that the comparison is essential for a clear understanding of meteorites as probes of the early history of the solar systems: (1) Monomict and polymict breccias occur in lunar rocks, as well as in achondritic and chondritic meteo-

rites, having resulted from complex and repeated impact processes. (2) Chondrules are present in lunar, as well as in a few achondritic and most chondritic meteorites. It is pointed out that because chondrules may form in several different ways and in different environments, a distinction between the different modes of origin and an estimate of their relative abundance is important if their significance as sources of information on the early history of the solar system is to be clearly understood. (3) Lithic fragments are very useful in attempts to understand the pre- and post-impact history of lunar and meteoritic breccias. They vary from little modified (relative to the apparent original texture), to partly or completely melted and recrystallized lithic fragments. Author

N75-14687*# California Univ., Berkeley. Dept. of Physics.
CLUES IN THE RARE GAS ISOTOPES TO EARLY SOLAR SYSTEM HISTORY
John H. Reynolds Houston, Tex. NASA 1974 29 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA-CR-141247; Rept-220) Avail: NTIS HC $3.75 CSCL 03B

Rare gases in meteorites and lunar samples are discussed stimulating the discovery of the solar wind. Radioactive isotopes are examined, making a correlation to the origin of the solar system. It is shown that the heights of the peaks above the horizontal lines represent the spectrum of the fissiogenic sample. Nuclear tracks of iodine, xenon, and plutonium detected in lunar rocks are also explained. M.C.F.

N75-14688*# Princeton Univ., N.J.
THE INTERIOR STRUCTURE OF JUPITER (CONSEQUENCES OF PIONEER 10 DATA)
R. Smoluchowski Houston, Tex. NASA 1974 23 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA
(NASA-CR-141173; Rept-221) Avail: NTIS HC $3.25 CSCL 03B

Models of the Jovian interiors are based on theoretical equations of state of hydrogen and helium supported by a few experimental points and an observed parameter such as oblateness, gravitational coefficients, heat emission, and magnetic fields. The models fall into three categories: (1) those which assume a uniform and rather low H2/He ratio throughout the planet, (2) those in which this ratio is solar and thus higher and (3) those which take into account the lack of complete miscibility of the two elements in the condensed state. Recent values of the observed parameters obtained by Pioneer 10 permit improvements of the first two models but also pose new questions. In the first category of models the new data indicate that the amount of hydrogen has to be increased, while in the solar models which have a heavy core (made of SiO2, MgO, Fe and Ni), the abundance of hydrogen has to be decreased, both changes pointing in the direction of incomplete miscibility present in the third category of models. Author

N75-14689*# Geological Survey, Denver, Colo.
EARLY HISTORY OF THE MOON: IMPLICATIONS OF U-Th-Pb AND Rb-Sr SYSTEMATICS
Mitsunobu Tatsumoto, Paul D. Nunes, and Daniel M. Unruh Houston, Tex. NASA 1974 45 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA Order T-2407-A)
(NASA-CR-141253; Rept-222) Avail: NTIS HC $3.75 CSCL 03B

Anorthosite 60015 contains the lowest initial Sr-87/Sr-86 ratio (0.69884 + or - 0.00004) yet reported for a lunar sample. The initial ratio is equal to that of the achondrite Angra dos Reis and slightly higher than the lowest measured Sr-87/Sr-86 ratio for an inclusion in the C3 carbonaceous chondrite Allende. The Pb-Pb ages of both Angra dos Reis and Allende are 4.62 x 10 to the 9th power years (4.62 billion years). Thus, the initial Sr-87/Sr-86 ratio found in lunar anorthosite 60015 strongly supports the hypothesis that the age of the moon is about 4.65 b.y. The U-238/Pb-204 value estimated for the source of the excess lead in orange soil 74220 is lower than the values estimated for the sources of KREEP (600-1000), high K (300-600) and low K (100-300) basalts. Author

N75-14690*# Massachusetts Inst. of Tech., Cambridge.
THE EVOLUTION OF THE MOON AND THE TERRESTRIAL PLANETS
M. Nafi Toksoez and David H. Johnston Houston, Tex. NASA Apr. 1974 114 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(Contract NAS1-9703; Grants NGL-22-009-187; NsG-7081) (NASA-CR-141252; Rept-223) Avail: NTIS HC $5.25 CSCL 03B

The thermal evolutions of the Moon, Mars, Venus and Mercury are calculated theoretically starting from cosmochemical condensation models. An assortment of geological, geochemical and geophysical data are used to constrain both the present day temperatures and the thermal histories of the planets' interiors. Such data imply that the planets were heated during or shortly after formation and that all the terrestrial planets started their differentiations early in their history. The moon, smallest in size, is characterized as a differentiated body with a crust, a thick solid mantle and an interior region which may be partially molten. Mars, intermediate in size, is assumed to have differentiated an Fe-FeS core. Venus is characterized as a planet not unlike the earth in many respects. Core formation has occurred probably during the first billion years after the formation. Mercury, which probably has a large core, may have a 500 km thick solid lithosphere and a partially molten core if it is assumed that some heat sources exist in the core. Author

N75-14691*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LUNAR ELEMENTAL ANALYSIS OBTAINED FROM THE APOLLO GAMMA-RAY AND X-RAY REMOTE SENSING EXPERIMENT
J. I. Trombla, J. R. Arnold (Calif. Univ., La Jolla), I. Adler (Md. Univ., College Park), A. E. Metzger (JPL), and R. C. Reedy (Los Alamos Sci. Lab.) Houston Tex. 1974 75 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA-TM-X-72195; Rept-224) Avail: NTIS HC $4.25 CSCL 03B

Gamma ray and X-ray spectrometers carried in the service module of the Apollo 15 and 16 spacecraft were employed for compositional mapping of the lunar surface. The measurements involved the observation of the intensity and characteristics energy distribution of gamma rays and X-rays emitted from the lunar surface. A large scale compositional map of over 10 percent of the lunar surface was obtained from an analysis of the observed spectra. The objective of the X-ray experiment was to measure the K spectral lines from Mg, Al, and Si. Spectra were obtained and the data were reduced to Al/Si and Mg/Si intensity ratios and ultimately to chemical ratios. The objective of the gamma-ray experiment was to measure the natural and cosmic ray induced activity emission spectrum. At this time, the elemental abundances for Th, U, K, Fe, Ti, Si, and O have been determined over a number of major lunar regions. Author

N75-14692*# California Univ., Los Angeles. Dept. of Planetary and Space Science.
PRE-MARE CRATERING AND EARLY SOLAR SYSTEM HISTORY
G. W. Wetherill Houston, Tex. NASA 1974 43 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA
(NASA-CR-141254; Rept-226) Avail: NTIS HC $3.75 CSCL 03B

An evaluation of the application of the high extra-lunar flux in pre-mare times to more general problems of early solar system history is attempted by combining the results of dynamic studies with lunar chronological data. Dynamical studies permit separate evaluation of the possible sources for both the normal flux during the first 600 m.y. years of lunar history as well as the peak which apparently occurred 4.0 b.y. ago. Dynamical studies have been carried out in order to determine the extent to which a heliocentric flux could be confined to the Moon (and

Earth). A Monte Carlo method has been used to calculate the relative impact rates of planet-crossing bodies with the moon and the terrestrial planets. It is concluded that the time-variation of the flux on these planets is closely related to that on the moon. Author

N75-14693*# Harvard Univ., Cambridge, Mass. Center for Astrophysics.
COMETS: DATA, PROBLEMS AND OBJECTIVES
Fred L. Whipple Houston, Tex. NASA 1974 17 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA
(NASA-CR-141241; Rept-228) Avail: NTIS HC $3.25 CSCL 03B

Relevant results from the observations of Comet Kohoutek are presented with an outline summary of basic knowledge concerning comets, both subjects being confined to data related to the nature and origin of comets rather than the phenomena (for example, plasma phenomena are omitted). Places of cometary origin in the developing solar system are discussed, along with the proto-Uranus-Neptune region versus the much more distant fragmented interstellar cloud region, now frequented by comets of the Opik-Oort cloud. The Comet Kohoutek results add new insights, particularly with regard to the parent molecules and the nature of meteoric solids in comets, to restrict the range of the physical circumstances of comet formation. Author

N75-14694*# State Univ. of New York, Stony Brook.
STUDIES OF CHEMICAL ABUNDANCES IN THE OUTER SOLAR SYSTEM
Tobias Owen Houston, Tex. NASA 22 Aug. 1974 16 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA
(NASA-CR-141170; Rept-229) Avail: NTIS HC $3.25 CSCL 03B

Ground-based observations and the Pioneer 10 mission have led to new discoveries and revisions of previous ideas about the outer solar system. Among these are the discovery of atmospheres on Io and Ganymede, emission from sodium and hydrogen in a cloud around Io, and the presence of acetylene, ethane, and phosphine in the atmosphere of Jupiter. Titan, the largest satellite of Saturn, continues to be an extremely interesting and baffling object, clearly very different in composition from the bodies familiar with in the inner solar system - which is also true of Ganymede and Callisto. New data on the abundances of methane and hydrogen in the atmospheres of Uranus and Neptune suggest that the values of C/H in these atmospheres may be much lower than had been previously thought. This result reinforces the apparent compositional difference between these two planets and Jupiter and Saturn, whose atmospheres exhibit a near-solar value for this ratio. Author

N75-14695*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVOLUTION OF THE MOON: THE 1974 MODEL
Harrison H. Schmitt 1974 33 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA-TM-X-72192; Contrib-2480; Rept-230) Avail: NTIS HC $3.75 CSCL 03B

Investigations are reported of Apollo and Luna explorations which have brought about the understanding of the moon and its structure. It is shown that with this knowledge of the moon, a better understanding is presented of the earth's origin, structure and composition. M.C.F.

N75-14696*# Bristol Univ. (England). Organic Geochemistry Unit.
THE EXPOSURE HISTORY OF THE APOLLO 16 SITES. AN ASSESSMENT BASED ON METHANE AND CARBIDE MEASUREMENTS
C. T. Pillinger, C. Eglinton, A. P. Gowar, A. J. T. Jull, and J. R. Maxwell Houston, Tex. NASA 1974 26 p refs Presented at Proc. of the Soviet-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974 Sponsored by NASA and Sci. Res. Council
(NASA-CR-141249; Rept-234) Avail: NTIS HC $3.75 CSCL 03B

Soils from eight stations at the Apollo 16 landing site have been analyzed for methane and carbide. These results, in conjunction with published data from photogeology, bulk chemistry, rare gases, primordial and radionuclides, and agglutinate abundances have been interpreted in terms of differing contributions from three components, North and South Ray crater ejecta and Cayley Plains material. Author

N75-14697*# Newcastle-upon-Tyne Univ. (England). School of Physics.
THE INTENSITY OF THE ANCIENT LUNAR FIELD FROM MAGNETIC STUDIES ON LUNAR SAMPLES
A. Stephenson, D. W. Collinson, and S. K. Runcorn Houston, Tex. NASA 1974 13 p Presented at Proc. of the Soviet-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA-CR-141250; Rept-237) Avail: NTIS HC $3.25 CSCL 03B

Palaeointensity determinations on Apollo 11, 16 and 17 rocks have indicated that 3.9 - 4.0 AE ago the strength of the surface lunar magnetic field was about 1.3 Oe while there is evidence from younger rocks that a field of about one quarter of this value was present at a later time (3.6 AE). Author

N75-14698*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CALCULATIONS OF THE MOON'S HEAT HISTORY AT DIFFERENT CONCENTRATIONS OF RADIOACTIVE ELEMENTS TAKING ACCOUNT OF THE MATERIAL DIFFERENTIATION WITH MELTING
O. I. Arnatskaya, Ya. I. Alber, and I. L. Ryazantseva 1974 32 p refs Presented at the Sov.-Am. Conf. on the Cosmochem. of the Moon and Planets, Moscow, 4-8 Jun. 1974
(NASA-TM-X-72201; Rept-240) Avail: NTIS HC $3.75 CSCL 03B

A mathematical procedure for analyzing the heat conductivity of the lunar surface is discussed. The solution is based on homogeneous and laminated moon models and considers the effects of radioactive elements conveyed to the lunar surface by melting. The various parameters which introduce uncertainties into the numerical analysis are identified. The application of data obtained from radio astronomy and from analyses of lunar samples returned by the Apollo flights is explained. Tables of data are included to show the types and amounts of radioactive materials which have been identified. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N75-14699# Osservatorio Astronomico, Rome (Italy).
AN EXPERIMENTAL VERIFICATION OF THE WILSON EFFECT [VERIFICA SPERIMENTALE DELL "EFFETTO WILSON"]
V. Croce and M. FerrariToniolo Dec. 1973 9 p refs In ITALIAN
(RR-15) Avail: NTIS HC $3.25

By consideration of photographic reproductions of a large sunspot on the limb which appeared on 24 September 1971, an attempt to determine the Wilson depression was made. Readings of photometric signals from an exploring telecamera were taken. For various heliocentric distances the separation between the ellipse centers representing the penumbra and the nucleus was determined together with the ratio between the depression and the actual penumbra diameter. The mean inclination of the penumbra and the angular variation of the relative nucleus section were also studied. Variations of the mean penumbra inclination with heliocentric distance are in agreement with theoretical estimates based on optical layer transparencies, and the absolute value of the measured depression is in agreement with forecasts when the associated magnetic field is taken into account. ESRO

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N75-14700*# Maryland Univ., College Park. Dept. of Physics and Astronomy.
A TIME-DEPENDENT DIFFUSION CONVECTION MODEL FOR THE LONG TERM MODULATION OF COSMIC RAYS
J. J. Gallagher Jun. 1974 42 p refs
(Grants NGL-21-002-006; NGL-002-033)
(NASA-CR-141146; TR-74-114) Avail: NTIS HC $3.75 CSCL 03B

A model is developed which incorporates to first order the direct effects of the time dependent diffusive propagation of interstellar cosmic rays in a slowly changing interplanetary medium. The model provides a physical explanation for observed rigidity-dependent phase lags in modulated spectra (cosmic ray hysteresis). The average distance to the modulating boundary during the last solar cycle is estimated. N.E.R.

N75-14701*# Maryland Univ., College Park. Dept. of Physics and Astronomy.
THE SPECTRUM OF COSMIC ELECTRON WITH ENERGIES BETWEEN 6 AND 100 GeV
Charles A. Meegan and James A. Earl Oct. 1974 53 p refs
(Grant NGR-21-002-066)
(NASA-CR-141287; TR-75-019) Avail: NTIS HC $4.25 CSCL 03B

This experiment was carried out during three balloon flights which provided a total exposure of 3500 + or - 60 sq m sec sterad at an average depth of 4.8 g/sq cm The detector, in which the development of cascade showers in a 33.7 rl absorber was sampled by 10 scintillation counters and 216 Geiger-Muller tubes, was calibrated at the Cornell Electron Synchrotron, the separation of cosmic electrons from the nuclear background was confirmed by extensive analysis of data from the flights, from the calibration and from ground level exposure. The spectral intensity of primary cosmic ray electrons were found in particles/sq m sec sterad GeV. Similarly, the ground level spectrum of secondary cosmic ray electrons was also found. The steepness of the spectrum of cosmic electrons relative to that of nuclei implies one of the following conclusions: either the injection spectrum of electrons is steeper than that of nuclei, or the electron spectrum has been steepened by Compton/synchrotron losses in the energy range covered by the experiment. Author

N75-14702# Denver Univ., Colo.
THE 13TH INTERNATIONAL COSMIC RAY CONFERENCE. VOLUME 5: MISCELLANY, INVITED LECTURES AND MEMORIAL SESSIONS, RAPPORTEUR PAPERS
1973 719 p refs Conf. held at Denver, 17-30 Aug. 1973
(Conf-730804-P5) Avail: NTIS HC $17.25

Manuscripts of accepted papers, lists of withdrawn papers, post-deadline papers accepted and presented at the conference, and erata are presented along with rapporteur papers. F.O.S.

N75-14703# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
CALIBRATION OF A NEUTRON TELESCOPE AND MEASUREMENT OF THE NEUTRON SPECTRUM IN THE UPPER ATMOSPHERE FROM 70-250 MeV [EICHUNG EINES NEUTRONENTELESKOPS UND MESSUNG DES NEUTRONENSPEKTRUMS IN DER OBEREN ATMOSPHAERE VON 70-250 MEV]
Gottfried Kanbach Feb. 1974 96 p refs In GERMAN
(MPI-PAE/Extraterr-94) Avail: NTIS HC $4.75

Neutron telescope calibrations with a neutron beam from an accelerator and the albedo neutron flux measurement during two balloon flights is reported. The neutron telescope was calibrated for particle energies of up to 140 MeV, using a synchrocyclotron. The threshold sensitivity, and directive and energy resolution were determined. Results were used in evaluating data from two balloon flights. ESRO

99 GENERAL

N75-14704*# Santa Clara Univ., Calif.
STUDIES IN MATTER ANTIMATTER SEPARATION AND IN THE ORIGIN OF LUNAR MAGNETISM. Annual Progress Report, 1 Jun. 1973 - 31 Aug. 1974
William A. Barker, Ronald Greeley, Curtis Parkin, and Hans Aggarwal 31 Aug. 1974 39 p
(Grant NGR-05-017-027)
(NASA-CR-141062) Avail: NTIS HC $3.75 CSCL 05B

Antimatter experiments of the University of Santa Clara are investigated. Topics reported include: (1) planetary geology, (2) lunar Apollo magnetometer experiments, and (3) Roche limit of a solid body. M.C.F.

N75-14705# Max-Planck-Institut fuer Physik und Astrophysik, Munich (West Germany). Inst. fuer Extraterrestrische Physik.
[ACTIVITIES OF THE INST. FOR EXTRATERRESTRIAL PHYSICS] Annual Report 1973 [TAETIGKEITSBERICHT 1973]
Jan. 1974 171 p refs In GERMAN
(MPI-PAE/Extraterr-93) Avail: NTIS HC $6.25

The 1973 annual report is presented. Activities include extraterrestrial plasmas and interplanetary medium, ultraviolet spectroscopy, high energy astrophysics, and infrared astronomy. ESRO

N75-14706# Laboratoire de Recherches Balistiques et Aerodynamiques, Vernon (France).
MISSILE ENVIRONMENTAL TESTS RECOMMENDATIONS [LES RECOMMANDATIONS D'ESSAIS EN ENVIRONNEMENT DES MISSILES]
A. Coty 1974 12 p In FRENCH Original contains color illustrations
(LRBA-NT-1/74/SEV) Avail: NTIS HC $3.25

The semantic distinction to be established between norms and environmental tests recommendations is detailed for missiles. The architecture of a recommendation is explained with regard to criteria manuals and procedures. The methodology to be used in devising a recommendation is discussed. The impact on users is reviewed with regard to program managers, test laboratories, recommendation usefulness and improvement of recommendations. ESRO

N75-14707# Ecole Nationale Superieure de Techniques Avancees, Paris (France).
[RESEARCH IN THE FIELDS OF CHEMISTRY, ELECTRONICS, ELECTROTECHNICS, HYDROTHERMODYNAMICS, MATERIALS AND STRUCTURES, AND COMPUTING METHODS] Annual Report, 1973 [ACTIVITES RECHERCHE 1973]
1973 164 p refs In FRENCH
Avail: NTIS HC $6.25

Research in combustion and thermochemistry is reported along with separation methods, phase equilibrium thermodynamics, and electrodiffusion. Other topics discussed include: interfaces and diphasdic media, metallurgy and material resistance, programming languages, graphical displays, and computer assisted education. ESRO

N75-14708# Office of the Chief of Research and Development (Army), Washington, D.C.
PROCEEDINGS OF THE 1974 ARMY SCIENCE CONFERENCE. VOLUME 2: PRINCIPAL AUTHORS I THROUGH R
26 Aug. 1974 559 p refs Presented at the 1974 Army Sci. Conf., West Point, N. Y., 18-21 Jun. 1974
(AD-785633) Avail: NTIS CSCL 05/2

This is Volume 2 of the 1974 Army Science Conference Proceedings. This volume contains the unclassified papers by principal authors I thru R which were presented at the conference, 18-21 June 1974, U.S. Military Academy, West Point, New York. GRA

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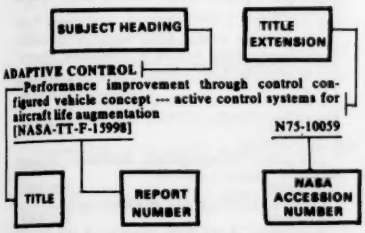
TYPICAL SUBJECT INDEX LISTING



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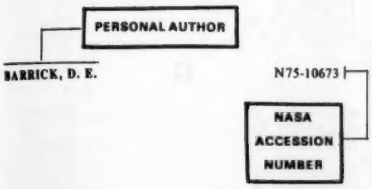

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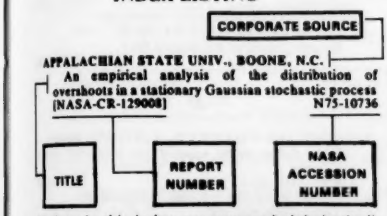
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Concept for a satellite-based advanced air traffic management system. Volume 9: System and subsystem performance models
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Concept for a satellite-based advanced air traffic management system. Volume 10: Subsystem performance requirements
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Production engineering measure for microwave transistors using proton enhanced diffusion technology
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AVCON UNIVERSAL CONSULTANTS CORP., BADEN, PA.
Development of microwave landing system implementation criteria
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AVIONS MARCEL DASSAULT-BREGUET AVIATION, SAINT-CLOUD [FRANCE].
Progress report on mechanical flaps
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BABCOCK AND WILCOX CO., ALLIANCE, OHIO.
Creep failure under uniaxial and multiaxial stress conditions
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BALLISTIC RESEARCH LABS., ABERDEEN PROVING GROUND, MD.
Sequence laser interferometry in a muzzle jet flow simulator
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The application of Skylab EREP data for land use classification and mapping in the Cleveland and Columbus areas
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Application of the AQDM model and the ATDL model and comparison of the results
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BATTELLE-NORTHWEST, RICHLAND, WASH.
Rate constants for the reaction of carbon dioxide and water vapor with KC graphite
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BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Effects of exposure to pulsed microwaves [radar] on central nervous system excitability in laboratory animals
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Study of the effects of fuel vortex film cooling on high temperature couting durability
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BELL HELICOPTER CO., FORT WORTH, TEX.
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 7: Preproduction evaluation of improved titanium surfaces preparation
[AD-785597] N75-13857
BENDIX CORP., ANN ARBOR, MICH.
Laser geodynamic satellite thermal/optical/vibrational analyses and testing. Volume 1: Executive summary
[NASA-CR-120562] N75-13902
Laser geodynamic satellite thermal/optical/ vibrational analyses and testing. Volume 2: Technical report, book 1
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Laser geodynamic satellite thermal/optical/ vibrational analyses and testing. Volume 2: Technical report, book 2
[NASA-CR-120564] N75-13904
Laser geodynamic satellite/thermal/optical vibrational analyses and testing. Volume 2: Technical report, book 3
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BENDIX CORP., KANSAS CITY, MO.
Rigid epoxy foam encapsulation
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Design manual for polystyrene foam, relating physical, mechanical, and chemical properties
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Evaluation of a high temperature syntactic foam
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Ultrasonic welding of electrical terminations
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BENDIX CORP., TETERBORO, N.J.
Advanced control moment gyro development
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BIRMINGHAM UNIV. [ENGLAND].
Investigation of reflector-antenna radiation
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BOCHUM OBSERVATORY [WEST GERMANY].
Environmental satellites and ERTS-1 imagery
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BOEING AEROSPACE CO., SEATTLE, WASH.
Dynamics of multirate sampled data control systems
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BOEING CO., KENT, WASH.
Quantitative determination of stratospheric aerosol characteristics
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BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
Jet noise suppressor nozzle development for augmentor wing jet STOL research aircraft [C-8A Buffalo]
[NASA-CR-137522] N75-13854

BOEING VERTOL CO., PHILADELPHIA, PA.
Test results report and design technology development report. HLH/ATC high-speed tapered roller bearing development program
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BOSTON UNIV., MASS.
Photochemical conversion of solar energy
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Photochemical conversion of solar energy
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BRISTOL UNIV. [ENGLAND].
Ground-truth measurements in relation to aircraft and satellite studies of agricultural land use and land classification in Britain
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The exposure history of the Apollo 16 sites. An assessment based on methane and carbide measurements
[NASA-CR-141249] N75-14696

BRITISH AIRCRAFT CORP., LONDON [ENGLAND].
A review of the lifting characteristics of some jet lift V/STOL configurations
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BRITISH BROADCASTING CORP., KINGSWOOD [ENGLAND].
A stereo digital sound recorder
[BBC-RD-1974/39] N75-14096

BRITISH COLUMBIA UNIV., VANCOUVER.
The aerodynamics of two-dimensional airfoils with spoilers
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BRITISH METEOROLOGICAL OFFICE, BRACKNELL [ENGLAND].
Some views on modeling dispersion and vertical flux
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BRITISH STEEL CORP., SHEFFIELD [ENGLAND].
The notch toughness of submerged arc weld metal in micro-alloyed structural steels
[PB-236369/5] N75-14180

BRUSSELS UNIV. [BELGIUM].
Statistical mechanics of nonuniform systems subjected to an arbitrary and time dependent external field. Dynamics of nonkinetic states and the superkinetic equation. Application to strong plasma turbulence
[EUR-CEA-FC-691] N75-14607

BUDAPEST SCIENCE UNIV. [HUNGARY].
Light cone physics and the parton model: General aspects and applications
N75-14524

BUREAU DE RECHERCHES GEOLOGIQUES ET MINIERES, ORLEANS [FRANCE].
ERTS image contribution to geological knowledge covering different types of climates [France, Togo, Dahomey, Madagascar]
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BUREAU OF MINES, ALBANY, OREG.
Reducing surface hot shortness of copper-containing steels using silicon additions and controlled reheating conditions
[PB-236269/7] N75-13973

BUREAU OF RADIOLOGICAL HEALTH, ROCKVILLE, MD.
Biological bases for and other aspects of a performance standard for laser products
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CALIFORNIA EARTH SCIENCE CORP., SANTA MONICA.
Fault tectonics and earthquake hazards in the Peninsular Ranges, Southern California
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CALIFORNIA INST. OF TECH., PASADENA.
Formation and composition of the moon
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CALIFORNIA STATE COLL., FULLERTON.
Analysis and optimization of cyclic methods for application in orbit computations
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CALIFORNIA UNIV., BERKELEY.
Clues in the rare gas isotopes to early solar system history
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CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Catalytic oxidation of SO2 on carbon particles
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Josephson junctions as microwave heterodyne detectors
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Low temperature studies. 1. New antiferromagnetic resonance effects in the iron-group fluorides. 2: Impedance matching a Josephson-effect galvanometer by means of a superconducting transformer
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CALIFORNIA UNIV., IRVINE.
Surface polaritons in high magnetic fields
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CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Gaseous metal hydroxides at high temperatures
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Numerical solution of ordinary differential equations: Lecture notes
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Electron excitation of high pressure Ar, Kr, and Xe
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CALIFORNIA UNIV., LOS ANGELES.
Phosphorescence-microwave multiple resonance spectroscopy of polyatomic molecules, part 1
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Low temperature triplet energy traps in organic solids using phosphorescence-microwave double resonance spectroscopy: Monomer and excimer, part 2
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Pre-mare cratering and early solar system history
[NASA-CR-141254] N75-14692

CALIFORNIA UNIV., SAN FRANCISCO.
Ecological factors involved in maintaining the biota of the anterior nares of man, 1968 - 1974
[NASA-CR-141248] N75-14430

CANADAIR, LTD., MONTREAL [QUEBEC].
Investigation of externally blown flap airfoils with leading edge devices and slotted flaps
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CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Solar sea power
[PB-235469/4] N75-14284

CENTRAAL INSTITUUT VOOR VOEDINGSONDERZOEK TNO, ZEIST [NETHERLANDS].
Preserving tests with oils and fats in the Fira-Astell oxygen absorption apparatus 1
[R-4439] N75-14469

CENTRAL RESEARCH INST. FOR PHYSICS, BUDAPEST [HUNGARY].
Universal algebraic construction of logics
[KFKI-74-41] N75-14503

CENTRE D'ETUDES PHYTOSOCIOLOGIQUES ET ECOLOGIQUES, MONTPELLIER [FRANCE].
Qualitative study of some ERTS-1 images of the Golion project. Ecological aspects of terrestrial environments
N75-14248

CENTRE D'INFORMATION DU COBALT, BRUSSELS [BELGIUM].
Cobalt-containing high-strength steels: A critical review of the physical metallurgy of cobalt-containing high-strength steels, and a survey of their processing, properties and uses
N75-13954

CENTRE DE RECHERCHES SCIENTIFIQUES ET TECHNIQUES DE L'INDUSTRIE DES FABRICATIONS METALLIQUES, BRUSSELS [BELGIUM].
Fatigue crack growth of central notched mild steel plates
[CRIF-MT-92] N75-14170

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, MARSEILLES [FRANCE].
Proposals for space research in 1974
[LAS-73-DRT-PRJ-02] N75-13897
Definition of the parameters related to the geometric transfer function in the ERC
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Experiment D2B, real time simulation and acquisition
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Proposition for participation in the LST project
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Star file exploitation on IBM 1130 computer ex SAO star catalogue
[LAS-CLC-01] N75-14661

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, ORSAY [FRANCE].
Electromagnetic and weak interactions, Volume 1
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CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, PARIS [FRANCE].
Effect of microstructural state on ductility and rupturing behavior of the titanium alloy TA6V
[REPT-038] N75-13966

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, TOULOUSE [FRANCE].
Stabilization of a geostationary satellite by means of redundant inertia wheel configurations
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High value resistors obtained by metallic ion implantation in thermal silica
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Bipolar semi-conductor device behavior under irradiation
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CER GEONUCLEAR CORP., LAS VEGAS, NEV.
Rio Blanco massive hydraulic fracture: Project definition
[PNE-MHF-1] N75-14254

CHEMICAL LAB. RVO-TNO, RIJSWIKJ [NETHERLANDS].
The generation of hydrogen for filling meteoballoons
[CL-1974-6] N75-13948

CHICAGO UNIV., ILL.
Radar measurement of atmospheric turbulence
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Meteoritic material on the moon
[NASA-CR-141242] N75-14673
Heterogeneities in the solar nebula
[NASA-CR-141243] N75-14675
Chemical fractionation in the solar nebula
[NASA-CR-141257] N75-14677

CHRYSLER CORP., NEW ORLEANS, LA.
Subsonic and transonic hinge moment and wing bending/torsion characteristics of .015 scale space shuttle models 49-0 and 67-TS in the Rockwell International trisonic wind tunnel [IA70], volume 1
[NASA-CR-134431] N75-13822
Subsonic and transonic hinge moment and wing bending/torsion characteristics of .015 scale space shuttle models 49-0 and 67-TS in the Rockwell International trisonic wind tunnel [IA70], volume 2
[NASA-CR-134432] N75-13823
Subsonic and transonic hinge moment and wing bending/torsion characteristics of .015 scale space shuttle models 49-0 and 67-TS in the Rockwell International trisonic wind tunnel [IA70], volume 3
[NASA-CR-134433] N75-13824

CIBA-GEIGY [UK] LTD., CAMBRIDGE [ENGLAND].
Basics of plastic tooling
N75-13980

CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Adaptation to vestibular disorientation. 12: Habituation of vestibular responses: An overview
[AD-780562] N75-14449

COLOGNE UNIV. [WEST GERMANY].
Some many body effects in high magnetic fields
N75-14556

COLORADO SCHOOL OF MINES, GOLDEN.
Geologic and mineral and water resources investigations in western Colorado, using Skylab EREP data
[E75-10071] N75-14190

COLORADO STATE UNIV., FORT COLLINS.
Combustion instability with partial length acoustic liners
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Primary data on economic activity and water use in prototype oil shale development areas of Colorado: An initial inquiry
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Solar thermal electric power systems
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COLORADO UNIV., BOULDER.
Variable speed commutatorless energy converters
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COMITATO NAZIONALE PER L'ENERGIA NUCLEARE, ROME [ITALY].
Burn-out correlation to scale water with Freon
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COMMISSARIAT A L'ENERGIE ATOMIQUE, FONTENAY-AUX-ROSES [FRANCE].
Kinetic equations for plasmas submitted to a strong time-dependent external field. 4: Renormalized stochastic treatment and Kraichnan model equation for turbulence
[EUR-CEA-FC-718] N75-14612
COMMISSARIAT A L'ENERGIE ATOMIQUE, GRENOBLE [FRANCE].
Acquisition and processing method for human sensorial, sensitive, motory, and phonatory circuits reaction times
[CEA-R-4534] N75-14450
Numerical simulation of the diffusion of impurities in a semiconductor. Application to the case of boron in silicon
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Jump conditions and entropy sources in two-phase systems
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COMMITTEE ON SCIENCE AND ASTRONAUTICS [U. S. HOUSE].
Aviation safety
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Conservation and efficient use of energy
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COMPTEURS SCHLUMBERGER, MONTROUGE [FRANCE].
The analysis, evaluation and optimization of satellite-borne power-supply units with the aid of a computer
[ESRO-CR-205] N75-13911
COMPUTER SCIENCES CORP., MOUNTAIN VIEW, CALIF.
A standard kinematic model for flight simulation at NASA Ames
[NASA-CR-2497] N75-14480
CONSIGLIO NAZIONALE DELLE RICERCHE, MILAN [ITALY].
Contribution of space platforms to a ground and airborne remote sensing programme over active Italian volcanoes
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CORNELL UNIV., ITHACA, N.Y.
Evaluation of Skylab imagery as an information service for investigating land use and natural resources
[E75-10068] N75-14187
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, PRETORIA [SOUTH AFRICA].
Forward integration along tubeside stream for rating multi-pass countercurrent cross-flow heat exchangers
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CRANFIELD INST. OF TECHNOLOGY [ENGLAND].
Superconducting magnet suspensions in high speed ground transport
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D

DANISH ATOMIC ENERGY COMMISSION, RISOE.
Statistical description of air pollution concentration, averaging time and frequency
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DANISH METEOROLOGICAL INST., COPENHAGEN.
Rude Skov Geophysical Observatory: Magnetic results, 1970
[ISBN-87-7478-087-5] N75-14325
Godhavn Geophysical Observatory: Magnetic results, 1970
[ISBN-87-7478-091-3] N75-14326
Godhavn Geophysical Observatory: Magnetic results, 1969
[ISBN-87-7478-090-5] N75-14327
DBA SYSTEMS, INC., MELBOURNE, FLA.
SARRA, a computer program for the short ARC reduction of radar altimetry
[AD-786479] N75-14021
DE HAVILLAND AIRCRAFT CO., LTD., DOWNSVIEW [ONTARIO].
Research into powered high lift systems for aircraft with turbofan propulsion
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DENVER UNIV., COLO.
The 13th International Cosmic Ray Conference. Volume 5: Miscellany, invited lectures and memorial sessions, rapporteur papers
[CONF-730804-P5] N75-14702
DEUTSCHE EDELSTAHLWERKE A.G., KREFELD [WEST GERMANY].
Development of a process for the manufacture of P/M high-temperature superalloys
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BAD GODESBERG [WEST GERMANY].
Behavior of circadian rhythm of temperature and performance after two subsequent transatlantic flights
[DLR-FB-74-55] N75-14461
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BERLIN [WEST GERMANY].
Description of turbulence and noise of an axisymmetric shear flow
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Coherent Structures in Turbulence
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Analysis of circumferentially coherent pressure fluctuations relevant to jet noise
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK [WEST GERMANY].
On the properties of the Generalized Integral of Squared Error [GISE]
[DLR-FB-74-45] N75-13880
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, FREIBURG [WEST GERMANY].
A photogrammetric method for measuring three-dimensional velocity fields in a flow visualized by hydrogen bubbles
[DLR-FB-74-37] N75-14085
DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN [WEST GERMANY].
A method for prediction of lift for multi-element airfoil systems with separation
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, MUNICH [WEST GERMANY].
Potentials to predict life of MoS2 lubricating layers in antifriction bearings in ultrahigh vacuum environment
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DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN [WEST GERMANY].
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DEUTSCHE GESELLSCHAFT FUER LUFT- UND RAUMFAHRT, COLOGNE [WEST GERMANY].
Airships
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Description of an airship design: limits for speed, size, adaptability
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Flight mechanics and control. Activities of the committees in 1972
[DLR-MITT-74-24] N75-13879
DEUTSCHE STUDIENGEMEINSCHAFT FUER LUFTSCHIFFAHRT, FRANKFURT AM MAIN [WEST GERMANY].
Flight in undulated flow: Airships with non-polluting propulsion systems
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DEUTSCHES ELEKTRONEN-SYNCHROTRON, HAMBURG [WEST GERMANY].
Experimental results on hydron production in inelastic electron scattering
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Generalized vector dominance
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DEUTSCHES HYDROGRAPHISCHES INSTITUT, HAMBURG [WEST GERMANY].
Use of ERTS-1 in sea-ice studies
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DEWEY ELECTRONICS CORP., PARAMUS, N.J.
An R and D effort to study the chemistry of a disturbed ionosphere
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DEXTER CORP., CITY OF INDUSTRY, CALIF.
Urethanes, elastomers for tooling
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DIRECTION DE LA METEOROLOGIE NATIONALE, PARIS [FRANCE].
Graphical representation of observational data from the buoy laboratory Borha 1 [period 1964 - 1970]
[MONO-94] N75-14347
DORNIER-SYSTEM G.M.B.H., FRIEDRICHSHAFEN [WEST GERMANY].
Prediction of aerodynamic interference effects with jet-lift and fan-lift VTOL aircraft
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Cable boom system for spin-stabilized satellites. Volume 1: Design study report
[ESRO-CR[P]-535-VOL-1] N75-13908
Cable boom system for spin-stabilized satellites. Volume 2: Testing, results and conclusions
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DOUGLAS AIRCRAFT CO., INC., LONG BEACH, CALIF.
Advanced tooling techniques using a thermoplastic compound
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Pu-238 fuel form processes
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Generalisation of ERTS data for global-scale investigations
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ECOLE NATIONALE SUPERIEURE DE TECHNIQUES AVANCEES, PARIS [FRANCE].
Effect of microstructural state on ductility and rupturing behavior of the titanium alloy TA6V
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Research in the fields of chemistry, electronics, electrotechnics, hydrothermodynamics, materials and structures, and computing methods
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ECOLE NATIONALE SUPERIEURE DES MINES, PARIS [FRANCE].
Colour composites of ERTS multispectral imagery for applications in hydrology and oceanography
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ECOLE NATIONALE SUPERIEURE DU PETROLE ET DES MONTEURS, RUEIL-MALMAISON [FRANCE].
Recent and present sedimentation complexity of the Rhone delta and the French mediterranean coast [Golion project]
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ECOLE NORMALE SUPERIEURE, PARIS [FRANCE].
Zero-gap semiconductors in high magnetic fields
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Experimental studies of HgTe in high magnetic fields
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ECOLE POLYTECHNIQUE, PARIS [FRANCE].
Preliminary results on antineutrino and neutrino total cross-sections
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ECON, INC., PRINCETON, N.J.
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 1: Summary
[NASA-CR-141268] N75-14203
The economic value of remote sensing by satellite: An ERTS overview and the value of continuity of service. Volume 2: Source document
[NASA-CR-141193] N75-14204
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 3: Intensive use of living resources: Agriculture. Part 1: Overview
[NASA-CR-141265] N75-14205
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 3: Intensive use of living resources, agriculture. Part 2: Distribution effects
[NASA-CR-141194] N75-14206
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 3: Intensive use of living resources, agriculture. Part 3: The integrated impact of improved [ERS] information on US agricultural commodities
[NASA-CR-141262] N75-14207

The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 4: Forestry, wildlife and rangeland
[NASA-CR-141263] N75-14208
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 5: Inland water resources
[NASA-CR-141269] N75-14209
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 6: Land use. Part 1: Introduction and overview
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[NASA-CR-141267] N75-14211
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 7: Non-replenishable natural resources: Minerals, fossil fuels and geothermal energy sources
[NASA-CR-141264] N75-14212
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 8: Atmosphere
[NASA-CR-141191] N75-14213
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 9: Oceans
[NASA-CR-141270] N75-14214
The economic value of remote sensing of earth resources from space: An ERTS overview and the value of continuity of service. Volume 10: Industry
[NASA-CR-141192] N75-14215

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Line shapes in donor spectra at high magnetic fields
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The remote identification of terrain features and materials at Pennsylvania test sites: An investigative study of techniques
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EUROPEAN SPACE RESEARCH ORGANIZATION, PARIS [FRANCE].
Calibration of three-component strain gauge balances for measurements of extremely low forces in low density flows
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[ESRO-SP-100] N75-14216

EUROSAT S.A., GENEVA [SWITZERLAND].
Study on the economic return of an operational maritime satellite system. Annex 2: Computer printouts
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International Magnetospheric Explorer Daughter study report. Volume 1: Summary
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Military transport [C-141] fly-by-wire program. Volume 1: Control law development, system design and piloted simulation evaluation
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Compatibility analysis of the Texas Instruments, ITT/gilfillan, Bendix, and hazeltine microwave landing system proposals
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Optical processing of ERTS-1 [MSS] images: Examples for the Arcachon basin and Rhone delta
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Supersonic turbulent boundary layer in the symmetry plane of a cone at incidence
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Analysis of two-dimensional biological receiver systems using detection experiments
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Some effects of ACTH 4-10 on performance during a serial reaction task
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[IZF-1974-21] N75-14460
INSTITUTO NACIONAL DE TECNICA AEROESPACIAL, MADRID [SPAIN].
Filtering theory applied to orbit determination
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Accurate integration of orbits using Delaunay-similar elements
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INSTITUTT FOR ATOMENERGI, KJELLER [NORWAY].
Electrochemistry of uniform corrosion and pitting of aluminium
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Noise properties of a VHF power amplifier theory and experiment
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Experimental observation of linear and nonlinear ion acoustic phenomena in a cylindrical geometry
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ISRAEL PROGRAM FOR SCIENTIFIC TRANSLATIONS, LTD., JERUSALEM.
Problems of wave propagation and diffraction, Volume 9
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The deep space network
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JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Stochastic methods in the applied theory of gyroscopes
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Translations on Eastern Europe: Scientific Affairs, no. 444
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Electrochemical carbon dioxide concentrator subsystem math model
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The limits of detectability of a low-light-level point-source sensor as a function of telescope aperture, sensor resolution, night-sky background, and pre-readout electron gain
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Water resource and hazard planning report for the Clark Fork River Valley above Missoula, Missoula County, Montana
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D.C.
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NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER, ATLANTIC CITY, N.J.

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NAVAL RESEARCH LAB., WASHINGTON, D.C.

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NORWEGIAN INST. FOR AIR RESEARCH, KJELLER.

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OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, TOULOUSE [FRANCE].

Metal-insulator transition in a hydrogen-like dense medium
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OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT [ARMY], WASHINGTON, D.C.

Proceedings of the 1974 Army Science Conference. Volume 2: Principal authors I through R
[AD-785633] N75-14708

OFFICINE GALILEO S.P.A., FLORENCE [ITALY].

Study of detection and estimation techniques applied to attitude measurements of satellites. Volume 3: Analysis of specific applications to star mapper and infrared earth sensor
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Study of detection and estimation techniques applied to attitude measurements of satellites. Volume 4: Computer programs documentation
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OHIO DEPT. OF ECONOMIC AND COMMUNITY DEVELOPMENT, COLUMBUS.

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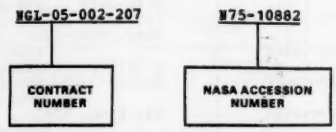

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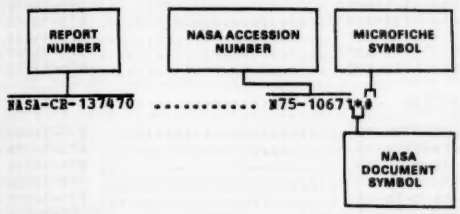

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KFK-PDV-21 ..... N75-14035 #
KFK-PDV-22 ..... N75-14485 #
KFK-PDV-23 ..... N75-14490 #
KFK-PDV-24 ..... N75-14106 #

KFK-1972 ..... N75-14491 #

KFKI-74-41 ..... N75-14503 #

KNMI-V-258 ..... N75-14351 #

KNMI-WR-74-8 ..... N75-14333 #
KNMI-WR-74-10 ..... N75-14352 #
KNMI-WR-74-13 ..... N75-14332 #

KR-149 ..... N75-13944 #

L-9469 ..... N75-14573*#
L-9721 ..... N75-13877*#
L-9758 ..... N75-13792*#

LA-UR-74-937 ..... N75-13959 #
LA-UR-74-1053 ..... N75-14033 #

LA-5599-MS ..... N75-14565 #
LA-5645 ..... N75-14587 #

LAAS-NT-SIS-74-T-15 ..... N75-14493 #

LAAS-PUBL-1100 ..... N75-14625 #
LAAS-PUBL-1198 ..... N75-13919 #
LAAS-PUBL-1204 ..... N75-14045 #

LAAS-74-I-25 ..... N75-14507 #

LAS-CLC-01 ..... N75-14661 #

LAS-OPT-029-73 ..... N75-14660 #

LAS-73-DRT-PRJ-01 ..... N75-14658 #
LAS-73-DRT-PRJ-02 ..... N75-13897 #
LAS-73-ELC-FAU-017 ..... N75-14659 #
LAS-73-ELC-071-D2B ..... N75-14110 #
LAS-73-ELC-077-D2B ..... N75-14476 #

LBL-1844 ..... N75-14566 #
LBL-2597 ..... N75-14036 #
LBL-2693 ..... N75-13933 #

LC-74-600024 ..... N75-14665*#
LC-74-600134 ..... N75-14670*#

LEC-3926 ..... N75-13914*#

LR:72;4213-01:1 ..... N75-14169 #

LRBA-NT-1/74/SEV ..... N75-14706 #

LSI-ER-220-6 ..... N75-14467*#

L0266 ..... N75-14093 #

M-TU-74-7 ..... N75-14134*#

MBL-1974-17 ..... N75-14432 #
MBL-1974-18 ..... N75-14433 #

MCR-74-185 ..... N75-14280 #

MI/KD-4363 ..... N75-14047 #

MLM-2114 ..... N75-14144 #
MLM-2124 ..... N75-14143 #

MONO-94 ..... N75-14347

MPI-PAE/EXTRATERR-93 ..... N75-14705 #

MPI-PAE/EXTRATERR-94 ..... N75-14703 #
MPI-PAE/EXTRATERR-97 ..... N75-14330 #

MPR-12 ..... N75-14202*#
MPR-18 ..... N75-14193*#

MRC-DA-422 ..... N75-13929 #

MRC-R-108 ..... N75-14023 #

MTR-2547-VOL-3 ..... N75-14494 #
MTR-6284-VOL-1 ..... N75-14264 #
MTR-6616-VOL-2 ..... N75-13876 #

MUJWRRC-51 ..... N75-14260 #

N-5/225/504/73.011 ..... N75-13900 #
N-5/225/504/73.012 ..... N75-13899 #

NADC-74072-30 ..... N75-13969 #

NASA-CASE-MFS-22707-1 ..... N75-14131*#
NASA-CASE-MFS-22729-1 ..... N75-14011*#
NASA-CASE-MFS-22957-1 ..... N75-14132*#

NASA-CR-2497 ..... N75-14480*#
NASA-CR-61385 ..... N75-14620*#
NASA-CR-120557 ..... N75-14027*#
NASA-CR-120559 ..... N75-14067*#
NASA-CR-120560 ..... N75-13898*#
NASA-CR-120561 ..... N75-14481*#
NASA-CR-120562 ..... N75-13902*#
NASA-CR-120563 ..... N75-13903*#
NASA-CR-120564 ..... N75-13904*#
NASA-CR-120565 ..... N75-13905*#
NASA-CR-120567 ..... N75-14097*#
NASA-CR-129043 ..... N75-13896*#
NASA-CR-132492 ..... N75-13926*#
NASA-CR-132826 ..... N75-14497*#
NASA-CR-134431 ..... N75-13822*#
NASA-CR-134432 ..... N75-13823*#
NASA-CR-134433 ..... N75-13824*#
NASA-CR-134719 ..... N75-13974*#
NASA-CR-134728 ..... N75-13927*#
NASA-CR-134733 ..... N75-13667*#
NASA-CR-134746 ..... N75-14060*#
NASA-CR-134747 ..... N75-14061*#
NASA-CR-134748 ..... N75-14062*#
NASA-CR-137474 ..... N75-14013*#
NASA-CR-137484 ..... N75-13932*#
NASA-CR-137522 ..... N75-13854*#
NASA-CR-137552 ..... N75-13868*#
NASA-CR-137565 ..... N75-14467*#
NASA-CR-139164 ..... N75-14585*#
NASA-CR-140380 ..... N75-14266*#
NASA-CR-140381 ..... N75-14267*#
NASA-CR-140382 ..... N75-13912*#
NASA-CR-140384 ..... N75-14577*#
NASA-CR-140386 ..... N75-13913*#
NASA-CR-140387 ..... N75-14098*#
NASA-CR-140388 ..... N75-13914*#
NASA-CR-140389 ..... N75-14479*#
NASA-CR-140726 ..... N75-14185*#
NASA-CR-141021 ..... N75-14186*#
NASA-CR-141022 ..... N75-14187*#
NASA-CR-141058 ..... N75-13838*#
NASA-CR-141059 ..... N75-14584*#
NASA-CR-141060 ..... N75-14669*#
NASA-CR-141061 ..... N75-14510*#
NASA-CR-141062 ..... N75-14704*#
NASA-CR-141092 ..... N75-14198*#
NASA-CR-141093 ..... N75-14197*#
NASA-CR-141094 ..... N75-14196*#
NASA-CR-141095 ..... N75-14195*#
NASA-CR-141096 ..... N75-14194*#
NASA-CR-141097 ..... N75-14193*#
NASA-CR-141098 ..... N75-14192*#
NASA-CR-141099 ..... N75-14191*#
NASA-CR-141100 ..... N75-14190*#
NASA-CR-141101 ..... N75-14189*#
NASA-CR-141102 ..... N75-14188*#
NASA-CR-141104 ..... N75-14199*#
NASA-CR-141105 ..... N75-14200*#
NASA-CR-141107 ..... N75-14201*#
NASA-CR-141108 ..... N75-14202*#
NASA-CR-141131 ..... N75-13925*#
NASA-CR-141132 ..... N75-14478*#
NASA-CR-141143 ..... N75-14666*#
NASA-CR-141144 ..... N75-14444*#

NASA-CR-141145 ..... N75-14667*#
NASA-CR-141146 ..... N75-14700*#
NASA-CR-141147 ..... N75-14010*#
NASA-CR-141168 ..... N75-14443*#
NASA-CR-141169 ..... N75-14668*#
NASA-CR-141170 ..... N75-14694*#
NASA-CR-141171 ..... N75-14682*#
NASA-CR-141172 ..... N75-14681*#
NASA-CR-141173 ..... N75-14688*#
NASA-CR-141186 ..... N75-14572*#
NASA-CR-141187 ..... N75-14657*#
NASA-CR-141191 ..... N75-14213*#
NASA-CR-141192 ..... N75-14215*#
NASA-CR-141193 ..... N75-14204*#
NASA-CR-141194 ..... N75-14206*#
NASA-CR-141241 ..... N75-14693*#
NASA-CR-141242 ..... N75-14673*#
NASA-CR-141243 ..... N75-14675*#
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NASA-CR-141245 ..... N75-14678*#
NASA-CR-141246 ..... N75-14686*#
NASA-CR-141247 ..... N75-14687*#
NASA-CR-141248 ..... N75-14430 #
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NASA-CR-141250 ..... N75-14697*#
NASA-CR-141252 ..... N75-14690*#
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NASA-CR-141254 ..... N75-14692*#
NASA-CR-141255 ..... N75-14684*#
NASA-CR-141256 ..... N75-14683*#
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NASA-CR-141262 ..... N75-14207*#
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NASA-CR-141264 ..... N75-14212*#
NASA-CR-141265 ..... N75-14205*#
NASA-CR-141266 ..... N75-14210*#
NASA-CR-141267 ..... N75-14211*#
NASA-CR-141268 ..... N75-14203*#
NASA-CR-141269 ..... N75-14209*#
NASA-CR-141270 ..... N75-14214*#
NASA-CR-141284 ..... N75-13886*#
NASA-CR-141285 ..... N75-14448*#
NASA-CR-141286 ..... N75-14447*#
NASA-CR-141287 ..... N75-14701*#
NASA-CR-141288 ..... N75-14656*#
NASA-CR-141289 ..... N75-14116*#
NASA-CR-141449 ..... N75-14597*#
NASA-CR-141450 ..... N75-14068*#
NASA-CR-141451 ..... N75-14099*#
NASA-CR-141452 ..... N75-14100*#
NASA-CR-141453 ..... N75-14431*#
NASA-CR-141455 ..... N75-14135*#
NASA-CR-141458 ..... N75-13915*#
NASA-CR-141466 ..... N75-13895*#

NASA-SP-341 ..... N75-14665*#
NASA-SP-4902 ..... N75-14670*#
NASA-SP-7037(49) ..... N75-13790*+

NASA-TM-X-3134 ..... N75-13870*#
NASA-TM-X-3147 ..... N75-14468*#
NASA-TM-X-3148 ..... N75-13869*#
NASA-TM-X-3163 ..... N75-13871*#
NASA-TM-X-3169 ..... N75-13825*#
NASA-TM-X-58152 ..... N75-14030*#
NASA-TM-X-58154-VOL-1 ..... N75-14358*#
NASA-TM-X-58154-VOL-2 ..... N75-14381*#
NASA-TM-X-62392 ..... N75-13851*#
NASA-TM-X-62393 ..... N75-13852*#
NASA-TM-X-62394 ..... N75-13853*#
NASA-TM-X-71972 ..... N75-13865*#
NASA-TM-X-72171 ..... N75-14032*#
NASA-TM-X-72190 ..... N75-14680*#
NASA-TM-X-72191 ..... N75-14679*#
NASA-TM-X-72192 ..... N75-14695*#
NASA-TM-X-72193 ..... N75-14676*#
NASA-TM-X-72194 ..... N75-14685*#
NASA-TM-X-72195 ..... N75-14691*#
NASA-TM-X-72196 ..... N75-14446*#
NASA-TM-X-72199 ..... N75-14134*#
NASA-TM-X-72200 ..... N75-13878*#
NASA-TM-X-72201 ..... N75-14698*#
NASA-TM-X-72535 ..... N75-14672*#
NASA-TM-X-72633 ..... N75-13866*#

NASA-TN-D-7751 ..... N75-14573*#
NASA-TN-D-7763 ..... N75-14495*#
NASA-TN-D-7778 ..... N75-13792*#
NASA-TN-D-7790 ..... N75-13877*#
NASA-TN-D-7839 ..... N75-14065*#
NASA-TN-D-7857 ..... N75-14073*#
NASA-TN-D-7859 ..... N75-13906*#
NASA-TN-D-7862 ..... N75-14066*#
NASA-TN-D-7868 ..... N75-13791*#
NASA-TN-D-7870 ..... N75-14136*#
NASA-TN-D-7871 ..... N75-13988*#

NASA-TT-F-15627 ..... N75-14664*#
NASA-TT-F-15710 ..... N75-14403*#
NASA-TT-F-15838 ..... N75-14598*#
NASA-TT-F-15971 ..... N75-14404*#
NASA-TT-F-16066 ..... N75-14442*#
NASA-TT-F-16069 ..... N75-14059*#
NASA-TT-F-16081 ..... N75-14441*#
NASA-TT-F-16086 ..... N75-13882*#
NASA-TT-F-16093 ..... N75-13864*#
NASA-TT-F-16117 ..... N75-14576*#

NEAR-TR-63 ..... N75-14184 #

NESTED-022-106 ..... N75-13841 #

NGR-23-014-002 ..... N75-14448*#

NIH/NHLI-N01-HT-4-2907-1 ..... N75-14278 #

NOLTR-74-35 ..... N75-14022 #

NP-20071 ..... N75-14081 #

NRL-MR-2839 ..... N75-14344 #
NRL-MR-2841 ..... N75-14088 #
NRL-MR-2870 ..... N75-14619 #

NRL-7656 ..... N75-14089 #

NSF/RA/N-74-0-81 ..... N75-14280 #
NSF/RA/N-74-043 ..... N75-14284 #
NSF/RA/N-74-045 ..... N75-14283 #
NSF/RA/N-74-048 ..... N75-14282 #
NSF/RA/N-74-087 ..... N75-14281 #
NSF/RANN/SE/GI-37815/PR/74/1 ..... N75-14283 #
NSF/RANN/SE/GI-38103/PR/73/4 ..... N75-14282 #
NSF/RANN/SE/GI-39114/PR/74-3 ..... N75-14284 #
NSF/RANN/SE/GI-41305/PR/74/2 ..... N75-14280 #

NSSDC-74-08 ..... N75-14672*#

N14-68-A-207-6-2 ..... N75-13972 #

OCR-74-INT-2 ..... N75-14273 #
OCR-86-F ..... N75-14279 #

ONERA-DERTS-NT-02-35 ..... N75-14626 #

ORNL-SUB-3654-1 ..... N75-14169 #

ORNL-TM-4543 ..... N75-13962 #

ORNL-TR-2833 ..... N75-13940 #

ORNL-4957 ..... N75-14502 #

OWRR-A-024-COLO(1) ..... N75-14277 #

OWRR-B-043-PA(1) ..... N75-14345 #

OWRR-C-3189(3198)(2) ..... N75-14184 #

P-412-10 ..... N75-14200*#

PA-TR-4700-PT-7 ..... N75-13857 #
PA-TR-4711 ..... N75-14581 #

PAPER-P-2 ..... N75-14091 #

PB-234042/0 ..... N75-14273 #
PB-234193/1 ..... N75-14338 #
PB-234264/0 ..... N75-13842 #
PB-234265/7 ..... N75-13843 #
PB-234266/5 ..... N75-13844 #
PB-234267/3 ..... N75-13845 #
PB-234268/1 ..... N75-13846 #
PB-234269/9 ..... N75-13847 #
PB-234270/7 ..... N75-13848 #
PB-234272/3 ..... N75-13849 #

PB-234273/1 ..... N75-13850 #
PB-235067/6 ..... N75-14026 #
PB-235298/7 ..... N75-14262 #
PB-235469/4 ..... N75-14284 #
PB-235474/4 ..... N75-14282 #
PB-235475/1 ..... N75-14283 #
PB-235700/2 ..... N75-14095 #
PB-235774/7 ..... N75-14321 #
PB-235794/5 ..... N75-14402 #
PB-235953/7 ..... N75-14440 #
PB-235991/7 ..... N75-14261 #
PB-235992/5 ..... N75-14263 #
PB-236008/9 ..... N75-14094 #
PB-236039/4 ..... N75-14277 #
PB-236041/0 ..... N75-14260 #
PB-236073/3 ..... N75-14345 #
PB-236156/6 ..... N75-14279 #
PB-236158/2 ..... N75-14156 #
PB-236159/0 ..... N75-14280 #
PB-236181/4 ..... N75-14278 #
PB-236266/3 ..... N75-14281 #
PB-236269/7 ..... N75-13973 #
PB-236288/7 ..... N75-14184 #
PB-236369/5 ..... N75-14180 #
PB-236425/5 ..... N75-14654 #

PHL-1974-07 ..... N75-14602 #
PHL-1974-26 ..... N75-14436 #

PNE-MHF-1 ..... N75-14254 #

PR-159 ..... N75-14324 #
PR-187 ..... N75-14576*#

PSSL-300874 ..... N75-14627 #

PT-2 ..... N75-14001 #

PUB-82 ..... N75-14345 #

PWA-FR-6487-VOL-3 ..... N75-13875 #

QPR-1 ..... N75-14283 #
QPR-3 ..... N75-14284 #
QPR-7 ..... N75-14200*#
QPR-9 ..... N75-14004 #

QR-2 ..... N75-14052 #

R-ILC-73-7/F ..... N75-14126 #

R-652 ..... N75-14618 #
R-1177-CE-VOL-3 ..... N75-13920 #
R-1178-CE-VOL-4 ..... N75-13921 #
R-4439 ..... N75-14469 #

RADC-TR-74-61-PT-2 ..... N75-14050 #
RADC-TR-74-152 ..... N75-14651 #
RADC-TR-74-188 ..... N75-13888 #
RADC-TR-74-202 ..... N75-14617 #
RADC-TR-74-203 ..... N75-14048 #

RAE-LIB-TRANS-1780 ..... N75-14031 #
RAE-LIB-TRANS-1794 ..... N75-14182 #
RAE-LIB-TRANS-1798 ..... N75-13958 #
RAE-LIB-TRANS-1814 ..... N75-13987 #

RAE-TR-74009 ..... N75-13997 #

RDR-1778-2 ..... N75-13999 #

REPT-11/1974 ..... N75-14606
REPT-12/1974 ..... N75-14513
REPT-20/1974 ..... N75-14130
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REPT-24/1974 ..... N75-14162
REPT-27/1974 ..... N75-14129
REPT-35 ..... N75-14285
REPT-73-3-LIN ..... N75-14622 #
REPT-74-2002-10-VOL-3-PT-1 ..... N75-14205*#
REPT-74-2002-10-VOL-3-PT-2 ..... N75-14206*#
REPT-74-2002-10-VOL-3-PT-3 ..... N75-14207*#
REPT-74-2002-10-VOL-4 ..... N75-14208*#
REPT-74-2002-10-VOL-5 ..... N75-14209*#
REPT-74-2002-10-VOL-7 ..... N75-14212*#
REPT-74-2002-10-VOL-8 ..... N75-14213*#
REPT-74-2002-10-VOL-9 ..... N75-14214*#
REPT-74-2002-10-VOL-10 ..... N75-14215*#
REPT-74-2002-10-1-VOL-1 ..... N75-14203*#

REPT-74-2002-10-2-VOL-2 ..... N75-14204*#
REPT-038 ..... N75-13966 #
REPT-186-S ..... N75-14084 #
REPT-194-M ..... N75-14002 #
REPT-202 ..... N75-14673*#
REPT-203 ..... N75-14674*#
REPT-204 ..... N75-14675*#
REPT-206 ..... N75-14676*#
REPT-207 ..... N75-14677*#
REPT-208 ..... N75-14678*#
REPT-210 ..... N75-14679*#
REPT-211 ..... N75-14680*#
REPT-212 ..... N75-14681*#
REPT-213 ..... N75-14682*#
REPT-214 ..... N75-14683*#
REPT-215 ..... N75-14684*#
REPT-217 ..... N75-13840 #
REPT-218 ..... N75-14014 #
REPT-218 ..... N75-14685*#
REPT-219 ..... N75-14686*#
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REPT-222 ..... N75-14689*#
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REPT-224 ..... N75-14691*#
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REPT-1184-AMS ..... N75-14627 #
REPT-1974-09-17 ..... N75-14047 #
REPT-3028-U ..... N75-13924 #
REPT-8701-910045 ..... N75-14068*#

RL-74-059 ..... N75-14474 #

RR-15 ..... N75-14699 #

RT/ING-(74)7 ..... N75-14630 #

RUB-LMRT-3 ..... N75-14038 #

S-3-74-085-VOL-1 ..... N75-13912*#

SAI-73-629-LJ ..... N75-14595 #

SAM-TR-74-24 ..... N75-14470 #

SAMSO-TR-74-188 ..... N75-13901 #
SAMSO-TR-74-208 ..... N75-13922 #
SAMSO-TR-74-212 ..... N75-14662 #
SAMSO-TR-74-214 ..... N75-14049 #
SAMSO-TR-74-215 ..... N75-14154 #

SAND-74-56 ..... N75-14079 #
SAND-74-0008 ..... N75-13887 #
SAND-74-0029 ..... N75-14157 #
SAND-74-8201 ..... N75-14484 #

SAPR-1 ..... N75-14019 #
SAPR-1 ..... N75-14280 #

SC-RR-69-233 ..... N75-14167 #

SD-45087 ..... N75-13889 #

SER-42 ..... N75-14026 #

SLA-73-0058 ..... N75-14498 #
SLA-73-1088 ..... N75-14482 #
SLA-74-9 ..... N75-14167 #
SLA-74-186 ..... N75-13992 #
SLA-74-270 ..... N75-14501 #
SLA-74-274 ..... N75-14586 #
SLA-74-0195 ..... N75-14473 #
SLA-74-0201 ..... N75-14183 #
SLA-74-5078 ..... N75-14268 #

SLL-74-0208 ..... N75-13963 #

SR-1 ..... N75-13951 #

SR-1 ..... N75-14340 #
SR-1 ..... N75-14349 #
SR-1 ..... N75-14355 #
SR-18 ..... N75-14335 #

ST-74-10 ..... N75-13919 #

STI-TR-1014-3-VOL-1 ..... N75-13851*#
STI-TR-1014-3-VOL-2 ..... N75-13852*#
STI-TR-1014-3-VOL-3 ..... N75-13853*#

SU-SEL-74-001 ..... N75-14572*#

SU-TR-3606-9 ..... N75-14572*#

TB-148 ..... N75-14477 #

TDCK-64275 ..... N75-14346
TDCK-64281 ..... N75-14453 #
TDCK-64282 ..... N75-14602 #
TDCK-64323 ..... N75-13947 #
TDCK-64418 ..... N75-14172 #
TDCK-64560 ..... N75-14432 #
TDCK-64575 ..... N75-14454 #
TDCK-64576 ..... N75-14455 #
TDCK-64630 ..... N75-14456 #
TDCK-64633 ..... N75-14433 #
TDCK-64715 ..... N75-14457 #
TDCK-64982 ..... N75-13948 #
TDCK-64990 ..... N75-14601 #
TDCK-65078 ..... N75-14458 #
TDCK-65086 ..... N75-14000 #
TDCK-65109 ..... N75-14108 #
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